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The Edward Williams Lecture

It is to be regretted that this year's Edward Williams Lecture was not open for discussion, as there were several statements which required elucidation. The lecturer, Mr. W. F. Cartwright, took for his subject the "Use of Castings in a Modern Iron and Steel Works." By and large, he shows how, during the last 40 years, welding has made tremendous inroads into the domain of iron castings. It should be remembered, however, that the work described in general does not enter into the field of quantity production, where costs find themselves at competitive levels. We received the impression that in steelworks practice, when improvements are sought, the engineers first examine the potentialities of welding before exploring what can be done by redesigning castings. We recall the case which happened in the early days of welding, when a works manager informed the foundry foreman that he had lost job number XYZ, as by substituting this casting by a weldment he could buy for 16s. instead of 22s. The foreman replied that if he would accept such a simplified (and ugly) model he would make it for 12s.

Foundrymen will examine Table II with interest, wherein are detailed the present-day uses of ferrous castings (other than cast iron) in an iron and steel works; as two columns are respectively headed S.-g. Iron and Meehanite, they will contend that these alloys are still cast iron. An extremely useful pointer in Mr. Cartwright's lecture is the cost comparison between cast steel and welded charging boxes. With a marginal difference of only £15 on a total cost of the order of £200, it is incumbent on the steel founder to tool-up for their manufacture, to induce the steel manufacturer to supply figures for the relative lives of the two types and to get the co-operation of the designers.

It can be presumed that all industries keep changing the demands they make on their traditional suppliers and amongst these is the foundry industry itself. Before us as we write, in a copy of *Aluminium News*, is an article showing how light alloys are replacing steel plates and sections in marine engineering—we quote for example: In the 12,800-ton s.s. Sunrip, "all-aluminium beams and the 592 Metalumber aluminium hatch-boards weighed 32½ tons and saved 35½ tons of weight." Again, despite the decreased use of copper-base castings by the iron and steel industry, the brassfoundry industry increased its output by 18 per cent. last year and this year current production is again forging ahead. Though the picture painted by Mr. Cartwright is pretty gloomy, there is no need for foundrymen to be unduly depressed. Yet the main message remains—that in a changing world, but little reliance can be placed on continuity of orders from any of the so-called established sources. Cast iron has been superseded for many purposes, but still it flourishes!

Featuring . . . .

H. J. V. WILLIAMS

MR. WILLIAMS, newly elected president of the Institute of British Foundrymen, is a nephew of the late Mr. C. E. Williams, who was president in 1933-34. He is joint managing director of John Williams & Sons (Cardiff), Limited, and a great grandson of the founder of this company, which has been trading since 1844. Educated at Leys School, Cambridge, Mr. Williams followed this by part-time study in engineering and metallurgy at Cardiff Technical College and University College, Cardiff, and received his early practical training in the various departments of the family business. He then concentrated on the constructional-engineering side and foundrywork, and in recent years the latter has claimed most of his attention. Under his direction, the company's foundry started to make castings for the trade in alloy cast-irons over 20 years ago, since when these have always been a feature of the work turned out.

In addition to serving as president of the Wales and Monmouth branch of the Institute for two years, Mr. Williams has been a branch delegate to the general Council for a number of years and was at one time the Wales and Monmouth branch representative on the Technical Council. He is a member of Council of the British Cast Iron Research Association and of both the development and information committees of that organization. Amongst his other activities is his membership of the governing body of the Llandaff Technical College, which has recently introduced new foundry and patternmaking courses, the development of which Mr. Williams personally initiated. He has also been for many years a member of the executive of the Engineering and Allied Employers (South Wales) Association, and he is a member of the Court of Governors of University College, Cardiff.

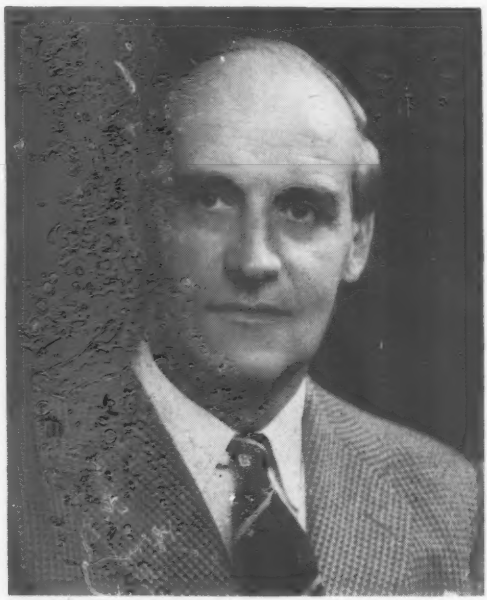
John Williams, whose recreations are golf, fly fishing and oil painting, is gifted in many ways and inspires the conviction that he will bring to the high office of IBF president the enthusiasm, the keen spirit of service and leadership which are called for. His considerable reputation as a foundryman, his particularly pleasant personality and his sustained work for the Institute since his election in 1933 have already secured for him a place of high esteem, and his many friends are confident he will be a worthy successor in office to his illustrious uncle.

H. J. V. WILLIAMS

President, the Institute of British Foundrymen.

Edward Williams Lecturer

Mr. W. F. Cartwright, whose Edward Williams lecture to the Institute of British Foundrymen is printed in this issue, was born on November 13, 1906, and was educated at Dragon School, Oxford, and at Rugby. In 1925, he commenced his engineering training as chief mechanical engineer's pupil at the Great Western Railway Company's Swindon works and, after three years, passed on to the drawing office in the early part of 1928. In 1929 he joined Guest, Keen and Nettlefolds, Limited, and took up an appointment at their Dowlais works, where he remained until the autumn of 1930. In that year he was given the opportunity to broaden his experience by a first-hand study of practice in continental iron and steelworks and spent the following



W. F. Cartwright, D.L., J.P., M.I.Mech.E.

twelve months as a student at the Works Roesch Köln A.G. at Dortmund, August Thyssen Hûtte, Duisburg, A.R.B.E.D. Esch, Luxemburg and de Wendel et Cie, Hayange, France. Towards the end of 1931, Mr. Cartwright returned to Great Britain and became assistant to the works manager of the Port Talbot works of Guest, Keen, Baldwins Iron & Steel Company, Limited. After serving four years in that capacity he was appointed technical assistant to the managing director, and held this position until 1940; it was during this period that the East Moors works of Guest, Keen, Baldwins were reconstructed and extended, and he was very largely concerned with this important undertaking.

In 1940, he was elected to the board of directors of Guest, Keen, Baldwins Iron & Steel Company, Limited, and at the same time was appointed the company's chief engineer. Further promotion came three years later, when, in 1943, he became general manager of the company's Margam and Port Talbot

(Continued at foot of col. 2)

works. When the Steel Company of Wales was formed in 1947, he became a director of the company and general manager of the steel division, and in 1954, he was also made an assistant managing director.

Mr. Cartwright, who is a Deputy Lieutenant of the County of Glamorgan and a Justice of the Peace, was elected a member of the Iron and Steel Institute in 1936, and in 1946, when the Council appointed an engineering committee to form an Iron and Steel Engineers Group, he became the first chairman, and was elected a member of the Council. He is also a member of the Institution of Mechanical Engineers and serves on the committee of the South Wales branch.

Institute Golf

The annual meeting of the Institute of British Foundrymen's Golfing Society will be held at Woodhall Spa on September 29 and 30. Non-playing IBF members and their wives are particularly welcome. All will stay in one party at the Golf Hotel, which offers first-class accommodation. The cost is £3 15s. 0d. per head from Friday night (including dinner) to Sunday (including luncheon). Separate days (including all meals and afternoon tea) £1 17s. 6d. per head. The standard scratch score is 74 and handicaps are limited to 24. A course allowance will be made on receipt of a score card of the course on which competitors are handicapped.

Saturday Morning.—A medal round of 18 holes—couples will be arranged on a similar-handicap basis. The lowest net score returned wins the IBF Handicap Challenge Cup, to be held for one year (present holder, Mr. A. T. Johnston), the lowest gross score returned wins the IBF Scratch Challenge Cup, to be held for one year (present holder, Mr. P. G. Pennington). The two winners will also be presented with the usual IBF tankard prizes, kindly presented by the then immediate past-president of the Institute (Dr. A. B. Everest). No competitor can win more than one prize in the morning. Ties, if any, will be decided on the last nine holes, or if necessary, on the last 12 or 15 holes, and sweepstakes will be divided. There is also a Veterans Cup open to those aged 55 and over. A replica of this cup has been kindly presented for the winner by Mr. W. E. Aske. Concurrently with this competition, the Coronation Shield will be competed for by teams of three from each branch of the Institute to be represented (to be nominated by 10 p.m. on Friday, September 28). The branch team with the lowest net aggregate wins and holds the shield for one year (present holders—West Riding of Yorkshire, second team).

Saturday Afternoon.—A two-ball foursome against bogey under 3/8 of combined handicaps for a 5s. per head entrance fee and sweepstake. Two Lincoln "Imps" go to the winners, kindly presented by the Lincolnshire branch. Partners will be drawn on the "sheep-and-goats" basis.

Sunday.—A four-ball Stableford will be held (7/16 combined handicap)—partners will be by personal arrangement for a prize of one-dozen golf balls (kindly presented by Mr. T. A. Oxley) and sweepstake.

Ladies Competition.—This will be for the Coronation Rose Bowl—highest Stableford score wins and holds the award for one year (present holder, Mrs. A. E. Phillips). Entrance fee and sweepstake 5s. per head.

Green fees of 10s. per day (one round 5s.) are to be paid to the IBF Golfing Secretary, Mr. P. G. Pennington—to whom all entries should be sent not later than August 24—c/o G. Oxley & Sons, Limited, Vulcan Foundry, Sheffield, 4.

IBF Edward Williams Lecture, 1956

Use of Castings in a Modern Iron and Steel Works

By W. F. Cartwright, D.L., J.P., M.I.Mech.E.

Rolls and ingot moulds are not dealt with in this Paper. They are in themselves vast subjects and merit special papers to deal with them. The Author's intention is to show where and why castings are used in the construction of iron and steel plant to-day, and what trends may be observed in their use. For the purpose of this Paper, the castings have been divided into ferrous and non-ferrous groups.

FERROUS CASTINGS

Table I shows how the use of iron castings is limited to-day to special types, as compared with the almost universal use of simple cast iron 40 years ago. The development of cheap mild steel was probably the biggest influence in the reduction of the use of cast iron. Another major factor was the development of the oxy-acetylene torch which made it easy to cut and repair mild steel, but yet was of little assistance with cast iron. Later came the application of welding for repair work and this, again, further hastened the decrease in the use of cast iron. To-day, this development of welding has also threatened the use of castings as a whole.

Table II indicates where steel castings are used to-day, although there are many cases where it is possible to use a weldment, instead of the casting shown. On the other hand, it is not usual to substitute weldments for any of the castings shown as manganese-steel or alloy-steel castings, or for any heat-resisting applications.

The mechanical properties of cast iron, s.-g. iron, cast steel and weldments are shown in Table III. After considering these mechanical properties, the operator has to choose the most desirable material, bearing in mind certain factors. First, of course, there is the economic factor, which has been very well dealt with in Mr. H. Mottram's paper to the Institute of British Foundrymen[1]. Summarizing his conclusions, for the steel casting the weight of liquid metal required for a finished job is in a ratio of 1.8:1, whereas in a weldment, the ratio is approximately 1.3:0.8, where the casting is 1. For the casting, the labour required is 5,585 direct hours plus indirect hours in the ratio of 1.77:1, giving a total of 15,470 hours. In the case of the weldment,

* Delivered on Wednesday at the annual conference in Cardiff of the Institute of British Foundrymen.

TABLE I.—*Uses of Cast Iron in an Iron and Steel Works, 40 Years Ago and To-day.*

Uses in coke ovens.		Uses in blast furnaces.		Uses in sinter plants.	
40 years ago.	To-day.	40 years ago	To-day.	40 years ago.	To-day.
Doors and frames Ascension pipes Stills and exchangers Scrubbers and coolers Ram heads Charging-hole frames Gear wheels Ammonia-pump parts Heater elements Cocks and valves	Floor plates of hot-coke car Tops of ascension pipes Charging-hole frames Ammonia-pump parts	Slag notches and troughs Iron runners Explosion doors Slag and iron ladles Stack coolers Stove valves and doors Stove grids Furnace columns Furnace lintel-plates Bell lips and rings Bells and hoppers (whole) Charging-skip details Furnace-throat linings Washer casings	Slag notches and troughs Iron and slag runners Explosion doors Stove coolers and grids	Pallets Grate bars	Pallets Grate bars (*Note:* S.-g. iron and "Vesuvious" steel being used experimentally.)

Uses in melting shops.		Uses in soaking pits and reheating furnaces.		Uses in mills.	
40 years ago.	To-day.	40 years ago.	To-day.	40 years ago.	To-day.
Furnace doors Furnace door-frames and cills Dampers and frames Reversing valves and boxes Mushroom-valve seatings Slag pans Teeming-nozzle details Furnace bracing details Dyblic valve pans Hydraulic cylinders Gas-producer bells and hoppers Stage floor plates	80-ton Furnace-cill castings Reversing valves, dampers and seatings	Covers and frames Slag pots Slag spouts Gas-producer bells and seats Furnace door and cills Furnace bracing details Hydraulic cylinders Gas-producer grates	Slab-furnace castings	Housings and chocks Strippers and guides Live rollers, bearings and frames Hydraulic cylinders Breakers Mill couplings and spindles Reduction gearboxes	Delay-table rollers

for direct labour hours he quotes 6,728 plus indirect hours 0.48:1, a total of 9,945 hours.

There is no fixed ratio between the weight of a casting and the weight of a weldment, but it is generally true that a weldment may be anywhere from equal in weight down to 60 per cent. of the weight of a comparable casting. There is a major factor in the comparison between a casting and a weldment in economics, and that is the number of articles required. Obviously, since a pattern is usually an expensive thing, the casting will tend to be cheaper, as the quantity ordered increases. There is, however, very little real repetitive work in an iron and steel works.

One factor which affects the economics, but also affects other things, is the possibility with the casting of a failure, due to say a blowhole, when the casting is nearing the completion of machining. This is not normally the case with the weldment, although again there is always a possibility that a laminated slab may be encountered well on in the machining or welding process. Another important factor could be the speed of delivery when a breakdown has taken place. There is no doubt that this speed of delivery is affected by the pattern situation. If a pattern is available, clearly the manufacture of the casting can begin quicker than if a new pattern has to be made. An excellent example of the saving in speed which can be made on a large, important job, is given in Fig. 1, which shows the comparative times to be taken in the production of a large cast-steel manipulator head and the same job to be done in welded mild-steel. This comparison assumes that there is no mishap in the manufacture of the casting, but only too frequently in such jobs defects have shown up in the casting, or distortion has taken place, so that a new start has to be made with moulding when the job has been well advanced. This is one of several things which have caused the delivery promises for steel castings to be treated with some reserve.

A further major advantage shown in Fig. 1 is in the machining time of the weldment. This is because it was possible to carry out machining on four separate pieces of the weldment on four separate machines, and then jig the machined pieces together on the welded framework for one final skim-up, whereas in the case of the casting, it was necessary to carry out all machining on the casting at once. Photographs of casting and weldment are shown in Fig. 2.

For reliability in service, it cannot be said that weldments are superior to castings or *vice versa;* they both have weaknesses. In the paper by Weck[2] it is shown that it is unwise to allow for an endurance limit of an unmachined normal shop weld of more than 4 tons per sq. in. in any structure which is going to be subjected to alternating stress. On the other hand, a steel casting of good design should be able to take a fatigue stress of more

TABLE II.—*Present-day Uses of Ferrous Castings (other than Cast Iron) in an Iron and Steel Works.*

Section of plant.	Cast steel.	Manganese steel.	Alloy-steel castings.	S.-g. iron.	Meehanite.
Coke ovens	Oven doors and frames	Wearing plates in coke chutes	—	—	—
Blast furnaces and sinter plants	Small and large bells, seats and hoppers Bear valves Slag ladles Stove valves	Wearing plates in furnace hoppers and chutes Skip-tub wearing plates Pug-mill paddles	—	Blowpipes (experimental) Sinter-plant grate bars (experimental) Sinter-plant gear-wheels	—
Melting shops	200-ton furnace-cill castings Furnace charging boxes Slag ladles and bails Teeming-ladle stands	Wearing plates of edge-runner mills Crusher jaws Grab teeth	—	—	—
Soaking pits	Seal castings	—	12-25 per cent. nickel /chrome burner, pipes and nozzles	—	—
Slabbing mill	Manipulator heads Table girders Bearing cartridges Slab-shear knife-heads Brake drums	—	Table-drive spur-wheels	—	—
Hot-strip mill	Mill stands Pinion housings Roller-table spacers Mill entry-guides Looper castings Aprons Strippers on mill Rolls and roll chocks Deflectors on down coiler Live-roller frames	—	29 per cent. chrome slab-furnace hearth-skids Down-coiler bottom pinch rolls Table-drive spur-wheels	Run-out table rollers Down-coiler top and bottom pinch rolls Mill water-pump casings	—
Cold mill	"C" hook beam (for fly-sheared sheets)	—	Nickel/chrome burners on annealing furnaces	Bearing housings for disc-type edge guides on pickle lines	Hallden shears side frames
General overhead cranes	Charging-box frames Soaker stem castings Runwheel centres, shears, and trunnions	—	—	—	Brake drums

than this. The amount more probably depends on the skill with which the casting has been designed, to allow for the minimum stress raisers in the form of small fillets or rapid changes of sections. At the same time, the strength and reliability of the weldment can be improved by machining the welds flush. Fig. 3 shows actual tests carried out on pieces of mild steel of 0.14 carbon and 0.62 manganese per cent., welded together and subjected to alternating stress. The effect of machining of the weld is shown quite clearly.

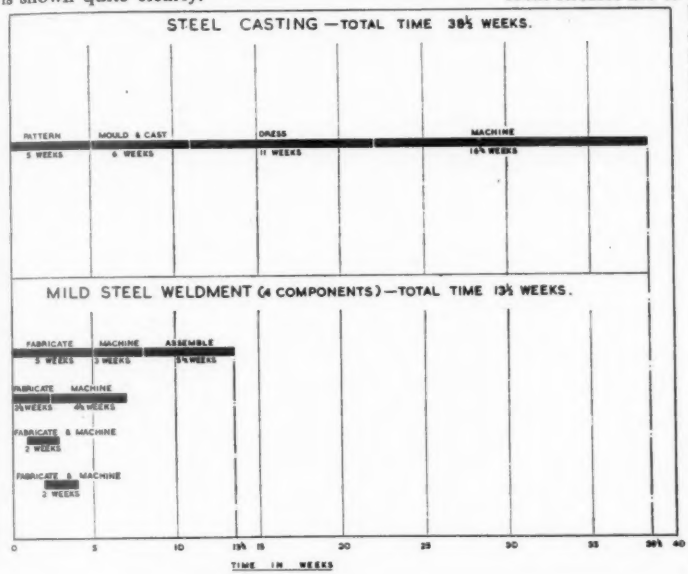


FIG. 1.—*Comparison of proposed delivery programmes for scabbing-mill manipulators—steel casting and mild-steel weldment.*

Future Trends

When considering these points, it is possible to form some judgment as to the future trend in the industry. It certainly seems that there is likely to be a further extension of the use of weldments made of heavy pieces of slab or plate, with carefully prepared welds and of designs which are properly suited to manufacture in this medium. These weldments may often incorporate steel castings welded into them where shape difficulties render weldments rather difficult to make. On the other hand, there is not much to be said in favour of using weldments for any heat-resisting steels or high-tensile steels, and anyone who uses soft mild steel where high local stresses are to be expected, such as under roller bearings, may find that the seat quickly becomes battered. For these purposes, steel castings of fairly high carbon content are better. Also it is easier to make a heat-resisting casting than a heat-resisting weldment.

A new process, the CO_2 Process, in regular operation in several British foundries, has a major advantage. Cores can be produced so quickly that on one occasion it proved possible for a 4½-ton steel slag-chute casting to be produced in 32 hours, where previously it had taken five days. The Process has little effect on the machine time and, of course, no effect on the patternmaking. The time saving is entirely confined to the casting and moulding. This can be an important matter in the case of a breakdown.

FIG. 2.—*Manipulator head: (a) constructed from a steel casting and (b) as a mild-steel weldment.*

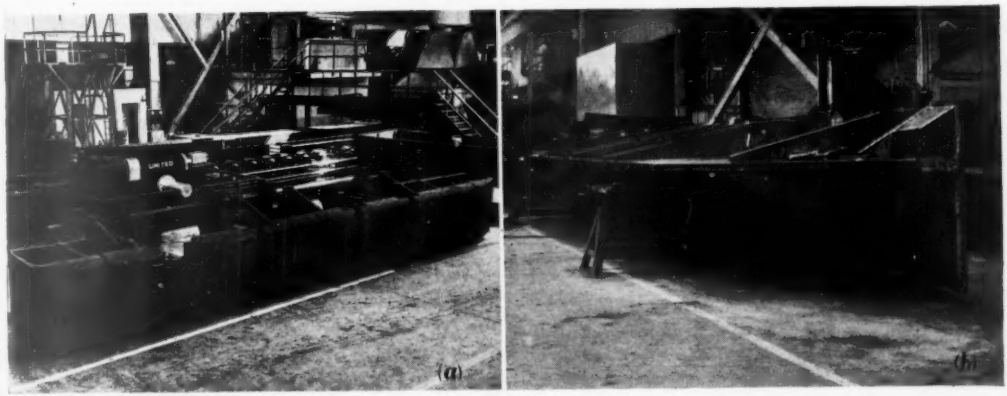


TABLE III.—*Properties of Cast Iron, S.-g. Iron, Cast Steel and Mild Steel.*

Metal.	Classification.	Direction of test.	U.T.S. tons per sq. in.	Elongation per cent. on 2 in.	Red. of area per cent.	Izod impact, ft.-lb.
Cast iron	Grades 10-12		9 to 13			
	Grades 14-17		13 to 19			
	Grades 20-26		18 to 28			
S.-g. Iron	As-cast		18	1 to 5		5.5
	Annealed		30	10 to 20		10 to 15
Cast steel	As-cast, annealed		27.5 28.5	16 25	10 40	5 20
Mild steel	10 ft. by 7 ft. 6 in. by 1 in.	Lengthwise	30.0	35	55	40
		Crosswise	29.6	33	48	31
	20 ft. by 5 ft. 0 in. by ½ in.	Lengthwise	31.0	32	50	45
		Crosswise	30.0	23	31	16
	18 ft. by 8 in. by 8 in.	Lengthwise	29.0	34	54	26
		Crosswise	28.2	26	28	18
	18 ft. by 5 in. dia.	Lengthwise	29.6	35	52	28
		Crosswise	28.3	20	24	12

Notes: (1) The long ½-in. plate has properties in the crosswise direction inferior to those of the 1-in. plate, because the latter has relatively more cross rolling.

(2) The 5-in. dia. round is inferior to the 8-in. square, having received more rolling in one direction.

Factors Affecting a Choice

Thus one may summarize the points which will decide the choice of ferrous material for a particular job.

First, is the first cost—the iron and steel maker is naturally anxious to have the job which will cost the least in the long run, that is the combination of first cost, life and reliability, but since life and reliability are difficult to estimate, first cost will always play a very important part.

Second, are the demands likely to be made upon the piece in service. Is it, for instance, to be subject to great heat.

Third, is the speed of replacement in the event of a breakdown. It is here undoubtedly that the weldment has recently been gaining ground. Although for an initial installation, the steel casting may perhaps be cheaper, very often where the plant is being held up for a replacement, first costs cease to have the importance they did in the original installation and speed of replacement becomes the vital factor.

Examples

Some examples may be quoted to illustrate the foregoing remarks. In Fig. 4, are shown drawings of two charging boxes, one in cast steel and one fabricated entirely (including the head) from mild steel. The costs of these two boxes are—mild steel £205, cast steel £190. The weight of the two boxes is very close—mild steel 2 tons, cast steel 2 tons 2 cwt. In service, both have given satisfaction. It has often been said that a casting will distort in heat less than mild steel, but for equal thickness and similar composition, there appears to be nothing in this at all, or is there any theoretical justification for saying this, and in fact, both charging boxes are free from any distortion troubles. Minor difficulties have occurred with the heads of both boxes,

TABLE IV.—*Uses of Non-ferrous Metals. 40 Years Ago and To-day.*

Section of plant.	Uses 40 years ago.		Uses to-day.	
	Bronzes.	Copper.	Bronzes.	Copper.
Coke ovens	Bearings and bushes Water cocks and valves	Little use for copper in its cast state—too soft to stand screwing up	Bearings and bushes, Water cocks and valves	—
Blast furnaces	Bearings and bushes Water cocks and valves	Tuyeres, coolers and slag notches Cardiff used copper hot-blast valves in 1940 Flat stack coolers	Pulley-sheave bushes	Tuyeres, coolers, seatings, elbows, nipples, etc. Pee-pees
Sinter plant	Bearings and bushes	—	Bushes on crushers	—
Melting shops	Bearings and bushes Water cocks and valves	—	Cross-travel and long-travel axle-box bearings on some overhead cranes. Bearing pads on hooks of 135- and 300-ton overhead cranes	Oxygen-gun noses
Soaking pits and reheating furnaces	Self-lubricating bearings on ingot bogies Bushes and bearings, various	—	Graphite-impregnated bushes on charger tongs	—
Mills	Live-roller bearings Mill bearings Screw-down nuts Various bushes	—	*Slabbing Mill*— Screw boxes, nickel-bronze and Lumen bronze Manipulator shoe, liners, slippers Slab-shear liners *Hot-strip mill*— Slippers on all stands Pull back liners Spray nozzles Breaker pads *Finishing Mills*— Acid-resisting bronze cradles Batch pickler	—

and cracks which have occurred from time to time are shown. However, if one can draw any conclusion from some years' experience it is that we tend to get more maintenance trouble, probably due to defective welds, with the welded boxes than the cast steel ones of the latest amended design.

A good example of a place where a casting is suitable and a weldment is not, is for brake drums. At the lecturer's works, it has been found that the only material which is really satisfactory for brake drums is high-duty cast iron, which has given every satisfaction after trying other materials.

An example of speed of replacement in the event of a breakdown has already been given in the case of the manipulator head. A further example, shown in Fig. 5, is the massive weldment which has been used to replace a broken roller-gear frame for a slabbing mill. The main frame has been manufactured from a slab 8-in. thick instead of a box-shaped casting. It is true that the resulting weldment is very much heavier than the casting,

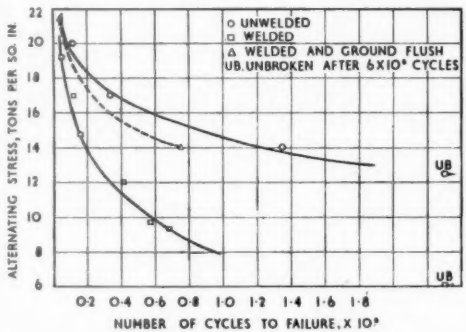


FIG. 3.—*S/N curves for mild steel containing* 0.14 *per cent. C and* 0.62 *per cent. Mn welded together.*

but the raw materials used (in this case a slab rolled at a few hours' notice in the firm's slabbing mill), were relatively cheap. It is felt that this weldment will derive advantages from its massiveness alone. The roller frame shown in the illustration was actually manufactured—from date of order to delivery—in two months, a time which could not possibly have been approached in the case of a casting where the pattern would have had to be made, as the original casting came from America.

In conclusion, one must say that the indications are that there will be further penetration of the steel-castings field by weldments in the near future, as designs specially suited for welding techniques are developed. At the same time, there will be much use of steel castings combined with weldments and, in certain cases, where heat-resisting steel is desirable, steel castings will still reign supreme. In other cases, where the job is a repetition one, such as charging boxes, steel castings may yet hold their own against the penetration of the weldment.

There are still one or two large special shapes where there seems little likelihood of the steel casting ever being displaced by the weldment. Examples are the very large conical bells and hoppers used for blast furnaces (see Fig. 6).

NON-FERROUS CASTINGS

Table IV shows the uses of non-ferrous castings in the iron and steel industry 40 years ago and today. It will be seen from this table that the use of non-ferrous castings shows development rather than change. The development of roller bearings has supplanted many brass and white-metal bearings, and the development of the highly finished steel pinion has supplanted many bronze pinions, but in

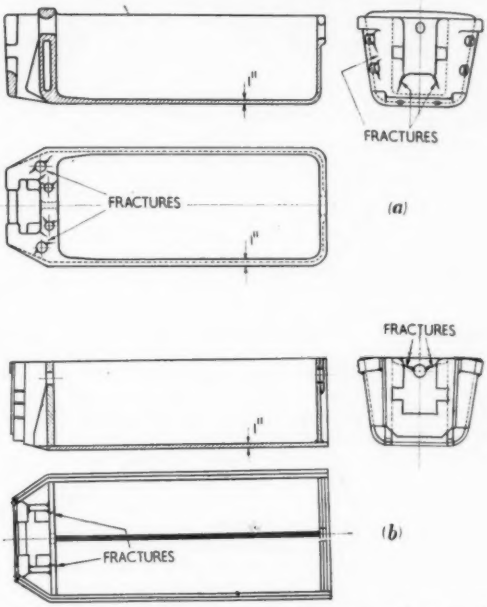


FIG. 4.—*Charging boxes: (a) cast steel and (b) fabricated, showing the locations of failures.*

all fields of sliding friction, bronze still remains the correct material.

Roll-neck Bearings

Forty years ago the iron and steel industry consumed vast quantities of bronze in roll-neck bearings, the lubricant being usually a simple block of tallow which relied on the heat of the roll neck to cause it to melt and form an oil film. The next development was the insertion of white-metal pads, which can have had but little effect. Always was there research for a very hard bronze which would yield good results with the minimum of lubrication. These heavy bronze bearings then gave way to bronze bearings with more elaborate white-metal inserts, with some form of continuous grease

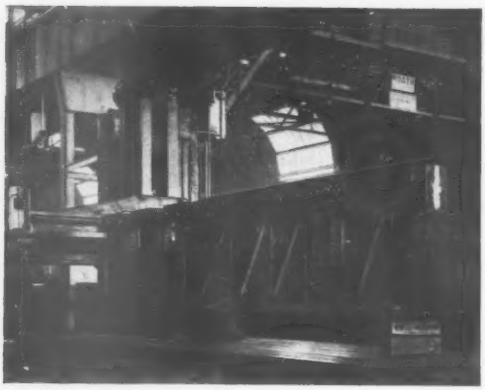


FIG. 5.—*Slabbing-mill back-table girder* 16 *ft.* 7¼ *in. long, made as a mild-steel weldment.*

lubrication, but ever since about 1935, there has been a gradual trend away from this type of bearing for all mills, and to-day we have reached the situation that for slabbing mills, idler bearings, flood-oil bearings or, occasionally, synthetic-fabric bearings with water lubrication, are the rule. I do not think that anybody to-day would use a white-metal or bronze bearing for a slabbing mill, and experience has shown that the power consumption when using roller bearings on a large slabbing mill is very much lower than is the case with even the most carefully supervised open-type, white-metal bearing. At the same time, it must be said that the modern flood-oil bearing gives perfect satisfaction in a slabbing mill.

In the finishing mills also, there has been a slow but steady trend away from bronze and white-metal bearings, the chief argument for retaining them being that they are relatively cheap and not so easily damaged when changing rolls. It is probably for this reason that they continue to be used in many heavy-section mills, which are subject to frequent roll changes. In wide strip mills, the tendency now is to standardize on flood-oil bearings for the back-up rolls, and roller bearings for the work rolls.

Table V gives the co-efficient of friction for various types of roll-neck bearings in descending order[3], from which table it is obvious that no-one, today, would build a mill in which the roll-neck bearings were heavily loaded or use anything but roller bearings or oil-film bearings.

TABLE V.—*Values for the Coefficient of Friction for Various Materials Used in Roll-neck Bearings.**

Material.	Coefficient of friction.
Lignum vitae	0.19
Bronze, hand greased	0.08 to 0.15
,, force-feed greased	0.05 to 0.08
White-metal, force-feed greased	0.01 to 0.05
Taper-roller bearings	0.002 to 0.004
Oil-film bearings	0.001 to 0.005
Synthetic-resin, water only	0.005 to 0.013
,, ,, water and grease	0.004 to 0.015

* Source: "Roll Neck Bearings," Part I, by L. R. Underwood, D.Sc. (Eng.), Ph.D., A.C.G.I., M.I.Mech.E.

FIG. 6.—*Cast-steel blast-furnace bell.*

Other Machinery

In the manufacture of cranes, of which there is a large number in any iron and steel works, there has been a steady trend towards the use of roller bearings in the gear-boxes and elsewhere, but there has been much resistance to the use of roller bearings on the long travel axles. This was because it was said that a crane fitted with roller bearings on the long travel axle tended to run too freely. However, I think that this criticism was a poor one, and to-day few people would have any fears about fitting a crane with roller bearings on all motions, and from a maintenance point of view, this has proved to be the most satisfactory thing to do.

In the main mill machinery, such as roller gears, reduction boxes and the like, roller bearings have almost entirely ousted the bronze bearing, but there are certain fields in which this has not happened, such as with roller levellers where a very hard bronze bearing has proved the best type to have, the clearance between the individual bearings being too small to allow for the use of a satisfactory roller bearing.

On large and heavy rolling stock, such as is used in quantity around a modern iron and steel works, the trend is to use roller bearings, although these are much more expensive than oil-lubricated plain bearings. Table VI gives starting and running resistance for a large number of plain and roller bearings, from which it can be seen that the figures obtained vary considerably, but the starting resistance of roller bearings is always considerably lower than plain bearings.

In the field of heavy electrical steelworks engineering, there still seems to be some doubt about the advisability of using roller bearings. Although it is common practice to use roller bearings on motors up to about 500 h.p., it is interesting to query why this has been considered the limiting horsepower. An odd machine or two of over 1,000 h.p. has been built, but it seems that the difficulty of removing the bearings has so far stopped the development of

TABLE VI.—*Starting and Rolling Resistances of Heavy Railway Wagons.*

—	Type of wagon.	Type of bearings.	S.C.W. figures.	Published figures.
Starting resistances, lb. per ton	B.R., 4-wheeled, empty	Plain	14.1	16
	Pennsylvania R.R., 60-ton, loaded	,,		38.59
	S.C.W., 60-ton, loaded	,,	Max. 57.7 Min. 20.0	
	,, ,, empty	,,	Max. 45.0 Min. 38.0	
	U.S.A., 70-ton, coal, loaded	,,		40.9
	Pennsylvania R.R., 60-ton, loaded	Roller		4.38
	U.S.A., 70-ton, coal, loaded	,,		4.2
	S.C.W., ladle carriages	,,	4.5	
Rolling resistances, lb. per ton up to 15 m.p.h.	Illinois Central RR, freight, empty cars ..	Plain		6 to 7
	Illinois Central RR, freight, loaded cars ..	,,		3 to 4
	U.S.A., 70-ton, coal loaded	,,		3 to 4
	S.C.W., 80-ton, empty	,,	3 to 7	
	,, loaded	,,	3 to 6	
	U.S.A., 70-ton, coal, loaded freight car ..	Roller		2 to 3
	S.C.W., ladle carriages	,,	4 to 11	

this idea, although no doubt one of the split-roller-bearing manufacturers could deal with this situation.

White-metal Bearings

In the development of the flood-oil bearing, which in a way is a non-ferrous casting, since it is lined with white metal, it has been discovered that the white metal requires to be thin, the actual thickness of this metal in a modern flood-oil bearing being 0.1 in. Table VII shows the relationship between the thickness of white metal and the life[4], and the modern thin-walled bearing used in automobile construction is evidence of the trueness of this theory. It is thus surprising to find that in large electrical machines, it is still common practice to employ a cast-iron shell lined with white metal of a considerable thickness. Fig. 7(b) shows a bearing for a very large electrical motor of approximately 5,000 h.p. which failed in service, the line showing the position of the crack and the photograph Fig. 7(a) showing what it looked like. The thickness of the white metal is shown as an average of ½-in. and, in places, up to 1-in. It would seem that bearing manufacturers should give closer study to the effect of white-metal thickness on the life of the bearing, and re-design their bearings in the light of modern theory. This failure of bearings fitted with excessively large thicknesses of white metal is by no means uncommon, and has been experienced in recent years in iron and steel works, not only in motors, but also in such items as pinion housings.

Screw Drives

One point of great interest to many iron and steel manufacturers is that of the manufacture of

TABLE VII.—*Thickness of a White-metal Bearing and its "Life" Ratio.**

Thickness of Babbitt, in...	0.030	0.020	0.010	0.005	0.003
Life ratio ..	1	1	1.5	3.2	4.6

* Source: *Metals Handbook*, 1948 edition, pp. 746-748.

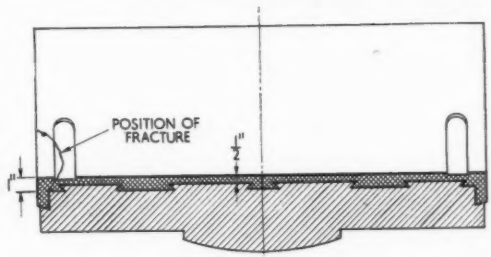


FIG. 7.—*White-metalled motor bearing which failed in service: (above) actual bearing surface and (below) section showing the design and position of the fracture.*

the nuts used in conjunction with the screws in slabbing mills and large section mills. There is no doubt that a hard steel surface upon another hard steel surface, properly lubricated, has quite a low co-efficient of friction and, in fact, there are many mills to-day running with steel screws in steel nuts, but the majority of mills are to-day fitted with bronze nuts and steel screws. It does seem as though the failure of steel nuts, where this has been experienced, is probably due to inadequate lubrication. Fig. 8(a) shows a slabbing-mill screw and nut as originally supplied by the makers and Fig. 8(b) the modifications which have been made to improve the lubrication. Previous to this lubrication improvement, it was commonplace to see brass emerging from the bottom of a nut. Now, possibly, with this very much improved lubrication system, it would be possible to change over to a steel nut instead of a bronze one.

Use of Castings in a Modern Iron and Steel Works

As Table IV shows, there are still many uses throughout an iron and steel works where there is no chance of the bronze casting being supplanted. They are mainly places where there is little hope of any real lubrication such as the shields on the hooks of a very-high-capacity ladle-crane, on the shoes and other devices on pickle lines, cut-up lines and elsewhere where scratching must be avoided, and in worms and wormwheels where sliding friction is bound to take place. Thus it can be said that, with the expansion of the iron and steel industry, there must also be a greater demand for bronze castings of all descriptions throughout the trade.

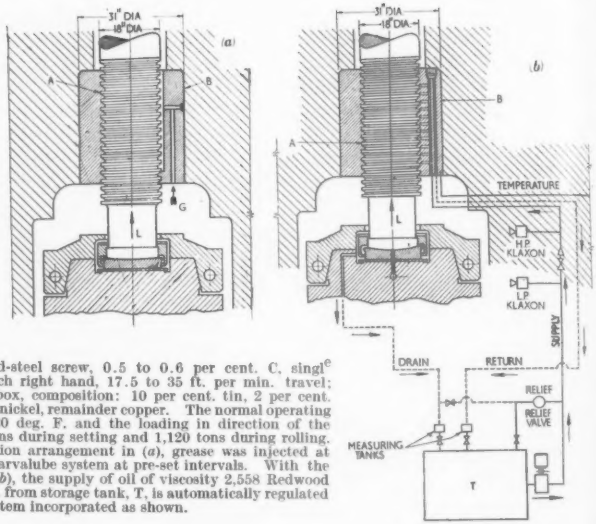


FIG. 8. — *Slabbing-mill screw box: (a) original and (b) modified lubrication arrangement.*

Key: A. forged-steel screw, 0.5 to 0.6 per cent. C, single thread, 2¼-in. pitch right hand, 17.5 to 35 ft. per min. travel; B. bronze screw box, composition: 10 per cent. tin, 2 per cent. zinc, 1.5 per cent. nickel, remainder copper. The normal operating temperature is 130 deg. F. and the loading in direction of the arrow, L, is 10 tons during setting and 1,120 tons during rolling. With the lubrication arrangement in (*a*), grease was injected at point G, from a Farvalube system at pre-set intervals. With the system shown in (*b*), the supply of oil of viscosity 2,558 Redwood secs. at 110 deg. F. from storage tank, T, is automatically regulated and a warning system incorporated as shown.

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1 "Castings *v.* Weldments," by H. Mottram, presented to the Institute of British Foundrymen. (FOUNDRY TRADE JOURNAL, December 9, 1954, p. 687).

2 "Design and Fabrication of Welded Structures Subjected to Repeated Loadings," Part II, by R. Weck, Ing.Ph.D., pages 22 and 22A.

3 "Roll Neck Bearings," Part 1, by L. R. Underwood, D.Sc. (Eng.), Ph.D., A.C.G.I., M.I.Mech.E.

4 "Metals Handbook," 1948 edition.

Colvilles Output Record

With an output of 1,022,987 tons, Colvilles, Limited, established a record in the company's history for the production of steel ingots and castings in the six months ended March 31. In the six months ended March 31, 1955, output was 960,845 tons. The group's pig-iron output was 383,944 tons (against 387,284 tons), while coke production totalled 352,540 (348,534) tons. Satisfactory progress is reported in the development scheme at Ravenscraig.

An interim dividend of 3 per cent., less tax, has been declared for the year ending September 30, 1956, which repeats the interim of the previous year, when a total of 11 per cent. was paid. Net consolidated manufacturing and trading profit and other income for the six months ended March 31, 1956, totalled £2,143,000, compared with £1,932,000 in the corresponding period a year ago. This figure was struck after £523,000 for depreciation, against £488.000, tax of £1,775,000 (£1,752,000), and after charging debenture interest.

US to Control Nickel Distribution

It was reported from Washington last week that the US Government plans to put distribution controls on nickel alloy deliveries starting in the fourth quarter of this year.

The Office of Defence Mobilization announced that the controls would require mills to set aside certain amounts of the scarce metal for defence use. Details of the controls would be worked out by the Commerce Department and issued in the near future.

Railway Rolling Stock Orders

More orders for rolling stock have been placed by the British Transport Commission under the railways modernization plan. The new contracts cover a total of 1,500 mineral wagons and 166 power equipments for diesel shunting locomotives.

Contracts have been placed with the following manufacturers:—

Butterley Company, Limited, Nottingham, 1,000 16-ton mineral wagons; Derbyshire Carriage & Wagon Company, Limited, Chesterfield, 500 16-ton mineral wagons; General Electric Company, Limited, 45 power equipments for diesel shunting locomotives; English Electric Company, Limited, 121 power equipments for diesel shunting locomotives.

The locomotives, for which the diesel power equipments are required, will be built in the British Railways workshops at Derby, Crewe, and Darlington for allocation to all regions.

UK Output in April

Industrial production during April is provisionally estimated by the Central Statistical Office at an index number of 136-137 (average 1948 = 100), compared with a revised figure for March of 140. Last year, when the Easter holiday fell entirely in April, the figure for that month was 134 and for March 143. This year Good Friday was in March and Easter Monday in April.

Mining output fell in the first quarter of this year, but production of gas and electricity continued to advance steadily. Output of manufactured goods in the first quarter, like total production, was unchanged compared with the first quarter of last year.

Institute Elects Vice-presidents

Senior Vice-president

At the annual general meeting of the Institute of British Foundrymen, John Blakiston was elected senior vice-president for the year 1956-57. Mr. Blakiston, who is in business as an engineer and foundry consultant, was born in 1903 and received his general and technical education at Middlesbrough High School. He served his apprenticeship at the Clarence Iron Works of Bell Bros., Limited, and was later employed as a draughtsman at these works. Following amalgamation of the firm with Dorman Long & Company, Limited, he became a shop superintendent in charge

Mr. John Blakiston

of the engineering shops and foundries. In 1930 he was transferred to the Middlesbrough Iron Works of Dorman Long & Company, a post which he relinquished in 1936 to join the staff of William Asquith, Limited. In addition to his present work as a consultant he is a director of W. Richards & Sons, Limited, and the Sandholme Iron Company, Limited. Mr. Blakiston joined the Institute in 1929, and was subsequently elected to the Council of the Middlesbrough branch. Following his transfer to the West Riding branch in 1936, he became one of their members of Council and was branch president in 1944-45. He has also served for many years on the General Council, on the Technical Council, and as chairman of some of the Institute's sub-committees. Mr. Blakiston has presented numerous technical papers to annual conferences and branch meetings of the Institute, and has taken a very active part in education work. He is a Liveryman of the Worshipful Company of Founders, and a member of the Institutions of Mechanical Engineers and Production Engineers. His hobbies include sailing, model engineering and shooting.

Junior Vice-president

Arthur E. Peace, who has been made junior vice-president, was educated at Sir Thomas Rich's School, Gloucester, and was subsequently a pupil in the Gloucester County Analyst's Laboratory, followed by periods as assistant chemist at the Westland Foundry of Petters, Limited, Yeovil, and the Brightside Foundry & Engineering Company, Limited, Sheffield. He then became chemist and metallurgist at Ley's Malleable Castings Company, Limited, and the Ewart Chainbelt Company, Limited, Derby. Later he was appointed a director of Ley's Foundries and Engineering Company,

Mr. Arthur E. Peace

Limited, and its two subsidiaries, Ley's Malleable Castings Company, Limited, and the Ewart Chainbelt Company, Limited. During the war, Mr. Peace acted as adviser to the Ministry of Supply in connection with tank tracks. He has made a number of visits to the United States and the Continent, and is the author of several papers and lectures delivered to branches of the Institute and to engineering societies and colleges. Mr. Peace is a member of the CFA technical committee, a member of Council of the BCIRA and chairman of the Association's Research Board and Research Committee. He is also an elected member of General Council of the Institute and a member of the technical research fund committee and of the literary and awards committee. Additionally, of course, Mr. Peace, who was the 1940 Oliver Stubbs medallist and the 1952 E. J. Fox medallist, is chairman of the Technical Council, an important office which he has filled with great distinction for some years. Mr. Peace is also a past-president of the East Midlands branch, a liveryman of the Worshipful Company of Founders and a freeman of the City of London.

Correspondence

DUST-REMOVAL PLANT

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—We refer to your issue dated May 31, page 37, in which under "New Catalogues" mention is made of our Solivore-Titan dust-removal plant. It appears to us on reading the review that one of the most important features of the Solivore-Titan plant has been overlooked, and in fact following the correspondence we have had from firms who have read the paragraph it does appear that they are obtaining an erroneous impression of the design.

Whilst it is correct to say that the Solivore-Titan plant involves a two-stage process, the most important feature is the fact that as the gases pass through the venturi tube between the top and bottom chambers an expansion of the gas takes place in the venturi throat. This results in a cooling effect, and condensation takes place on the dust-particle surfaces causing them to be coated with a liquid film. The venturi diffuser then gradually lowers the gas velocity so that most of the kinetic energy is recovered. It is in this section that agglomeration takes place. The most important feature is the fact that condensation takes place, and even the smallest particles of dust become coated with a liquid film. It is a well-known fact that very small particles of dust; that is in the sub-micron range, cannot be wetted by conventional water curtains or mist, in fact reference is made to this on page 387 of the same issue of the JOURNAL, where Mr. J. A. Wilkins refers to the surprisingly low efficiency of wet filters. This difficulty is overcome in the Solivore-Titan plant by the unique design which creates conditions where condensation takes place; thus, as will be seen from the leaflet, the equipment is capable of collecting particles of sub-micron ranges which cannot normally be collected by wet-type filters, unless these are of a very complicated and costly type involving many stages of washing.—Yours, etc.,

for CONSTRUCTIONAL ENGINEERING COMPANY, LIMITED,
J. H. GRAINGER,
Sales Manager.

June 6, 1956.

[Paragraphs printed under the heading "New Catalogues" deal more with the actual catalogue than a plant or process. The latter are normally dealt with under the heading "Equipment and Supplies."—Editor.]

International Electric-tool Manufacturers' Conference

The Portable Electric Tool Manufacturers' Association is acting as host to the Federation of European Electric Tool Manufacturers' Associations at the annual international conference, which opens at St. Ermins Hotel, Caxton Street, Westminster, S.W.1, on Wednesday, June 27. Of foremost importance on the agenda will be discussions on the standardizations of safety regulations as applied to portable-electric tools, which at present vary considerably between individual West European countries. Obviously, universally acceptable safety standards, when achieved, will be greatly to the advantage both of electric-tool users and manufacturers alike, and will tend to promote Britain's trade with her European neighbours.

The conference inauguration will be under the chairmanship of Mr. C. U. Peat, who is also chairman of the Association. General proceedings will be presided over by Mr. Herzog, of France, the president of the Federation.

GKN Expansion

Although augmented by the inclusion of the results of John Lysaght's Scunthorpe Works, Limited, and Brymbo Steel Works, Limited, and of steelworks and rolling mills in South Wales for a full 12 months period, the increased turnover of the Guest, Keen & Nettlefolds, Limited, group, was reflected in all sections in 1955. Higher outputs have been made possible only by substantial capital expenditure of over £41,000,000 in the last six years and, states Mr. K. S. Peacock, the chairman, most of this plant operated to capacity in 1955.

Referring to the John Lysaght's Scunthorpe Works, Mr. Peacock says finance might be obtained on a long-term basis to provide a substantial part of the funds required to repay the £9,000,000 unsecured loan from the Iron and Steel Holding and Realization Agency, repayable on or before June 30, 1958. Further capital expenditure is contemplated by both works which will increase steel supplies to the group.

The group's ratio of profit to turnover is low. Moreover, declares the chairman, with most of the plant operating near capacity, there can only be limited room for improvement in the profit ratio, while it could be greatly reduced by a fall in volume of turnover.

From an order and profit point of view, 1956 opened satisfactorily for the group, but works supplying the motor trade, and home domestic appliances, have experienced some recession already, adds the chairman.

Total consolidated net profit for the year amounted to £8,664,294, compared with £5,355,589 in the previous year. A proposed final dividend on the ordinary stock of 8½ per cent., less tax, makes with the interim dividend already paid, a dividend of 12 per cent., less tax, for the year.

POA Course for Senior Buyers

From November 7 to 11 next, the Purchasing Officers Association is running a senior buyers' course at Ashorne Hill, near Leamington Spa. It is intended to give senior buyers in industrial and public undertakings the opportunity of studying the various aspects of their function, in company with others of similar experience drawn from as wide a cross-section of industry as possible. The number attending will be limited to 50, but further courses will be arranged periodically. The leader will be Mr. J. Ferguson, B.Sc. (Tech.), of Chloride Batteries, Limited, and chairman of the Association's education committee. The fee of 15 guineas will include accommodation and all meals, and applications—on forms which may be obtained from the Association—should be submitted not later than September 1.

Latest Foundry Statistics

According to the Ministry of Supply, the output of aluminium castings during March was 2,006 tons from sand moulds, 4,293 tons as gravity-die, and 1,395 tons as pressure-die-castings. The three months' production in these three branches was 5,708, 12,936, and 4,323 tons respectively. The output of magnesium castings during March was 432 tons.

The Council of Ironfoundry Associations states that 145,444 ironfoundry workers were employed in the United Kingdom during the week ending March 31. The corresponding earlier figures were: March 3, 146,172, and April 2, 1955, 144,740.

Let us Take Stock

Presidential Address by H. J. V. Williams

At the Cardiff conference of the Institute of British Foundrymen, which opened yesterday, the new president, Mr. H. J. V. Williams, delivered his Address at the annual general meeting, as follows:—

DR. EVEREST—Gentlemen, it has always been the custom of this Institute to instal its new president at the beginning of its annual conference, and it does not seem out of place to consider what benefit we may derive from these annual gatherings which have been attended by increasing numbers over the years.

There is a poem by W. H. Davies which begins:—

"What is this life, if full of care,
We have no time to stand and stare?"

and, while the poet was thinking on different lines, it is not unfair to say that the foundryman to-day, involved in an ever-increasing tempo of working and living, finds the time at a conference to stand, and, if not to stare, to take stock under conditions especially propitious.

Few occasions are so suitable as a conference to consider what is this life, and how far we are successful in relating our work to the rest of our living. With a tendency to-day for many to separate their working time into a compartment distinct from the rest of their waking hours, it is good to remember how others live. An example of good integration is that of the farmer, whose means of livelihood is in fact a mode of living. So much of his time is a mingling of work with pleasure, and living with life. While factory or foundry life cannot be likened to this, there is much that we can achieve by avoiding too complete a line of demarcation.

On two occasions I have had the opportunity of discussing with artists who have visited our foundry, their reactions to what they have seen, and each time I have been surprised by their discoveries. One found beauty in the simplicity and economy of movement by men working; the other was attracted by the flames coming from moulds which cast an eerie light, mingled with the red glare of molten metal, on those attending the pouring.

Fresh thoughts, such as these were to me, must stimulate the imagination, and when considered and developed must help our minds to remain responsive to matters more closely associated with everyday problems, even if we sometimes feel, as with the poet, that our life is full of care.

Perhaps to some of us this care comes from the difficulties peculiar to our times; the changing quality of fuels, new legislation, perhaps new techniques, or a changing economy, but we might encourage ourselves by recalling the cares of our predecessors.

We know that castings have been made for upwards of five thousand years, and we may be sure that the ancient foundrymen had troubles which do not affect us. It is certain that superstition must have pursued him, and that religious prejudice interfered with the development of his craft.

Monopolies in Ancient China

Many here present have no doubt read a book by A. J. Forbes entitled "Metallurgy in Antiquity." He throws an interesting sidelight upon our modern problems of nationalization and monopolies. Two thousand and thirty-seven years ago the Chinese Emperor appointed a Royal Commission to investigate nationalization and monopolies. The story leading up to the Royal Commission of 81 B.C. is this:—Many years previously, two Chinese industrialists had amassed fortunes from salt and iron. In 119 B.C., the Government took over the control of these two products, and, being a monopoly, they charged excessive prices in order to replenish the depleted treasury. In 115 B.C., the Emperor appointed "officers to equalize distribution" and in 110 B.C., a bureau of standardization and equalization.

Customers complained bitterly of the quality of iron implements, whereupon in 81 B.C., the Emperor appointed his Royal Commission consisting of Crown Officers, certain *literati* and other worthy individuals. The report of the Commission showed up all the defects of state monopolies. In the report, castings are referred to as "melt-fuze."

So, too, can we trace in the history of our own islands, the founder's difficulties of fuel shortage and state legislation. A continuous tug-of-war prevailed between the shipbuilders and those who required timber for charcoal to fire their furnaces. In 1581, an Act of Parliament was passed requiring all building of iron foundries to cease, while in 1655, the State ordered the demolition of iron works in the Forest of Dean. As always, it depends on the individuals' outlook whether State interference is considered justified, because the action that must have seemed very high-handed to those ironfounders was perhaps justified if we recall how vital was the supply of timber as a war material. It took an acre of woodland to smelt three tons of iron. The writer, Evelyn, says that the commanders of the Spanish Armada were given orders to destroy our forests because they were the mainstay of England's strength.

There is always the ingenious industrialist, however, and much ore was exported to Ireland to be smelted there, and the metal imported to this country, but restrictions followed again and felling was later forbidden in that country.

Perhaps one might say that these early examples of fuel difficulties, solved only with the introduction of coke, existed in days when demands were not very exacting, but the spur of competition and economy must have been always there.

Let us Take Stock

Examples of Progress

In the 16th century when iron was smelted from local ore by local timber, an approximate output was a ton of iron from 50 man/days if expressed in terms of 8-hour shifts. For some comparison, it is of interest to note that to-day, when a ton of coal produces a ton of iron, this ton of coal is produced in less than a one-man shift, while the production from a modern blast-furnace is at least 8 tons per man shift.

Such encouragement as we may find by recalling the past is chiefly that man has, with great perseverance, gradually solved his problems, sufficiently at least to provide the western world to-day with a great degree of comfort, causing the disappearance of many of the daily hazards to existence. This progress has been achieved, despite little opportunity for consulting others, and numerous examples exist of particular developments being carried out independently yet simultaneously. It is only in comparatively recent times that we have gradually developed organized systems whereby all can obtain the results of individual researches, and where groups may gather to discuss and have interchange of knowledge.

Exchange of Knowledge

Let us, with our poet, " stand and stare awhile "; let us take time to discuss our thoughts and digest the thoughts of others. We may find that our thoughts are clarified by discussion and we are enabled to reach conclusions.

During this conference, as in others, some papers will be presented by our own members, who in so doing give us the results of their thoughts on the subjects of their choice. It is doubtful if any of these authors would deny that their subjects have been developed out of knowledge gained from similar works in the past, embellished by discussion with others, and used as seed in fresh ground. So too, will further papers be written in the future, which will develop themes propounded in the next few days.

Papers are also to be given by members of the research associations allied to our industry. This platform is one of the most suitable from which these may be presented, as the members of the associations will readily agree that a two-way flow of information makes their work more valuable. While the results of research must be understood and assimilated by the producers, so must the producers reveal their problems and suggestions to those employed on research. In what better way can an industry develop the products of research, or discuss its requirements for the future than through the Institute where contact is maintained throughout all facets of manufacture.

In addition to these, and foreign exchange papers, there is the work of our Technical Council whose reports are the best examples of the products of discussion and exchange of knowledge, carried out by members who sacrifice much time to it. It may not be appreciated how much we owe them, for the very reason that we (and they) realise that their work is based on one of the fundamental reasons for the existence of this Institute.

At the same time that we discuss our own problems, we must lend an ear to the casting user. One has often heard the complaint that in this country the engineer is slow to use new materials, and while this may be true to some degree, it is equally true that the engineer frequently requests qualities which are extremely difficult to obtain. The foundry industry has made great strides during the lifetime of our Institute; the development of various technologies and techniques has been rapid, yet we do not always keep in step with the requirements of designer and engineer. Sometimes one resents criticism, and may be tempted to reply in like kind, but as an industry we are not complacent.

Any industry, or a part of it, can be the target of praise or condemnation, according to how the facts are seen by the observer. An old religious writer, St. Egwin, spoke of ironfounders as " heathenish in their manners, puffed up with pride, and inflated with worldly prosperity," but I prefer to consider as more just, the words of Joseph Glanvill when, in the seventeenth century, he said " iron seemeth a simple metal, but in its nature are many mysteries, and men who bend to them their minds shall, in arriving days, gather therefrom great profit, not to themselves alone, but to all mankind."

Since the days when those words were written, we have seen the birth of steel and the light alloys, and I should like to substitute for the word iron, the words " foundry industry," and it would then be true that mankind has derived great profit from it.

What of the Future?

Yet what of the future? Once again it is profitable to remind ourselves of the past. This country was favoured during the last century through having an early start in the industrial revolution, which allowed us to gain a superior position as a supplier of capital and consumer goods. It would be unfair to say that we have allowed ourselves to be caught up and passed by other countries, as it is a natural consequence that the very capital goods we have supplied to others have been the means of producing consumer goods that now compete with our own products in the world's markets. It is unlikely that anyone at present can foresee a change in these conditions, where our standard of living depends on our ability to export. Even our present standard must be maintained in the face of competition from producers whose peoples do not demand, or who have not yet achieved, the high standards to which we have been accustomed. Productivity and quality are for us a necessity. In a technical institute such as ours, we cannot escape touching the fringe of the problems associated with productivity, as speed and economy have their own effects, and bring with them the new conditions which it is our proper function to consider.

To-day we live in a world of great challenge, we rely for our standard of civilization on the products of our workshops, and much that we produce is related in some form to the castings from our

Standards Officers' Conference

The second annual conference of standards officers, arranged jointly by the British Standards Institution and the Institution of Production Engineers, was held on May 24, at BSI's Park Street headquarters, under the chairmanship of Mr. R. E. Mills, chairman of IPE's standards committee. The standards officers present came from some of Britain's best-known companies: engineering concerns of all kinds; companies manufacturing aircraft and vehicles, electrical and electronic equipment and office machinery; and from the process industries—steel, oil and chemicals. Though there was much commendation for the standards published by the BSI, there was also some criticism. A delegate from the iron and steel industry, for example, complained of the great number of existing steel standards. An assurance came from Mr. G. Weston, BSI's technical director, that the Institution was now trying to secure a measure of simplification by reducing the number of standards for both steel and non-ferrous metals. A representative of a chemical firm wanted more standards, not for his company's end-products, but for the raw materials they bought.

A statement was issued by BSI's export panel in which it was suggested, that aids to easier world trading would be:

(*a*) British Standards (whether new or revised ones, should take into account overseas requirements—for where a well-conceived and widely accepted British Standard exists UK influence on any international recommendation was so much greater; and

(*b*) In some instances Britain should be prepared to compromise. In many branches of industry more could be sold abroad if manufacturers were not at a disadvantage through differing national standards requirements, and did not cling to a British specification which might be excessively elaborate or unnecessarily rigorous.

The conference welcomed these policies in a formal resolution.

Let us Take Stock

(*Continued from p.* 454)

foundries. In the endeavour to meet this challenge, our industry has at its hand a technical institute without rival in any sphere for the co-ordination of practical production and science. Its growing influence can partly be traced to its members being drawn from all sections of the industry. If the matters were discussed before a body of specialists in one science only, the results might be channeled into a single sphere. As the complexity of an industry grows, it becomes impossible for one man to master all aspects, but an appreciation of one another's problems is an aid to greater understanding of that part in which each of us is especially engaged.

I hope that the thoughts that I have just given you may persuade those, if any, who may previously have doubted that this conference can be the means through which we may add to our knowledge and turn this knowledge to good purpose. Our motto is not only just as true as it was on the day it was adopted, but it bears even greater significance now "Science hand in hand with Labour."

Expanding Laboratory Service

A visit paid recently to the R. H. Harry Stanger testing laboratories at Summerfield House, Barnet Lane, Elstree, Herts, revealed that the metallurgical section there is being expanded to take on more foundrywork. The laboratories act as independent and referee analysts and physical testing laboratories servicing mainly London and the South of England. The set-up at Elstree embraces the testing of all building and engineering materials, divided into metallurgical and structural testing and civil engineering (concrete, cement, paint, timber, etc.).

The metallurgical section, under the supervision of Mr. T. M. Calvert (himself a foundryman) covers the chemical analysis of metals and alloys, physical testing, metallography and some sand testing. Much equipment appropriate to these activities is already installed and more is envisaged in the extensions. Moreover, all the plant has the appearance of being well used—a feature contrasting favourably with some industrial "show" laboratories. For example, there are five tensile testing machines, ranging up to 100 tons load in addition to impact, hardness and torsion testing machines, Vickers and bench microscopes, rapid-analysis apparatus, etc.

Daily Service

Day-to-day service for analyses and physical testing is provided for a number of foundries in the area and here the importance of giving results quickly is well appreciated. The staff are often called upon to act as referee analysts or expert witnesses in compensation and insurance enquiries and Court cases. Local authority and shipping work is often undertaken, a recent case being the enquiry into a marine-boiler explosion where the appropriate member of the staff was retained as expert witness for the relevant Ministry and other authorities concerned. In many such cases, official recognition of the concern as inspecting authority is required, and the staff of the R. H. Harry Stanger laboratories are so approved for the Ministries and other responsible authorities, that it is often possible to arrange the release of batches of castings subject to inspection by these bodies on the laboratories' sole authority.

The testing of chains, slings, wire and hemp ropes as well as foundry bars is handled, and often heat-treatment, too, can be covered. Many firms send test-bars regularly for physical or chemical examination and this is a most welcome type of work because it permits of a balanced and continuous flow of work through the laboratories. In addition it was noted that the experts employed by this firm are often called upon to assist foundries in a practical manner if melting troubles are experienced.

In all, the tour of these premises proved most interesting and, as there are very few such independent laboratories, no apologies are needed either to the firm, who uphold a high standard of professional ethics, or to readers for bringing to their notice the existence of these laboratories.

MINING POTENTIALITIES for copper, near the Allihies area of West Cork, are to be commercially investigated by a Canadian mining corporation: sites at Beaubarc Co. Meath, and Castleblayney, Co. Monaghan, have already been inspected. Known as the Can-Eirin Mining Company, of Toronto, a subsidiary company, the Emerald Isle Mining Company, Limited, has been set up to exploit the West Cork copper deposits. This new company has an initial paid-up capital of £50,000.

Equipment and Supplies

Industrial X-ray Unit

In view of the fact that an increasing number of industries are using X-rays for non-destructive testing problems, Philips Electrical, Limited, Century House, Shaftesbury Avenue, London, W.C.2, have introduced the "Compactix 150," a new industrial X-ray unit rated at 150 k.v.p., 10 ma., the X-ray tube having a focal spot of 3 by 3 mm. The apparatus is in two main parts—the tube head and the control unit. The former consists of a cylindrical tank and contains the X-ray tube, a filament transformer and high-tension transformer. Electrical leads from the tube head to the control desk are restricted to mains tensions. The smallness of its dimensions—40-in. long by 14½-in. dia. —enables the tube head to be passed through narrow apertures. The whole tube-head assembly is oil-immersed and water cooled. The controls consist of the k.v.p. or penetration selector which is stepless from 50 or 150 kv.; milliampere selector, also stepless; synchronous motor-exposure timer (0-30 min.); mains-voltage compensator; a milliampere meter; kv. meter; indicator lamps showing "no water flowing" and high tension on; mains and high tension "on" and "off" push buttons. A number of alternative mountings are available for the tube head, which can be slung either vertically or horizontally from a hoist or crane, or as an alternative a mobile stand can be supplied.

Table Projector

A table projector, which provides a convenient way of viewing standard 2 by 2 in. colour slides, is a new piece of equipment produced by Kodak, Limited, Wealdstone, Middlesex. Known as the Kodaslide, it is self-contained and portable, no extra screen being required. The slides are projected at ×16 magnification on to a 6½-in. sq. translucent screen, which forms the front of the unit.

The optical system consists of a low-voltage lamp, reflector double condenser, 2-in. projection lens and two mirrors, all mounted on a steel chassis. The assembly has a moulded ventilated cover which can be quickly removed so that the lamp can be replaced and the lenses and mirrors cleaned. A plastics knob which protrudes through the top of the case focuses the image; lighting is supplied by a 6 v. 24 w. inverted "v" filament motor-car bulb. A sample, quick-loading slide carrier takes standard 2 by 2 in. slides either in "ready mounts" or other miniature slide frames or bound between glasses; the screen automatically "blacks out" when the slide is being changed.

Control Valves

To meet the needs of process-control systems where the pressure of the air supply is very low, the Baldwin Instrument Company, Limited, Brooklands Works, Dartford, Kent, have produced an operating mechanism which is sensitive to air pressures down to 1 lb. per sq. in. This degree of sensitivty is obtained by mechanically coupling a large synthetic-rubber diaphragm to the spool of the control valve, the pilot inlet connection being ¼ in. B.S.P. The system on which the range of equipment is based makes it possible for the mechanism to be fitted to ¼-in. and ½-in. bore, 2-, 3- and 4-way valves. The most common combination is to fit the diaphragm mechanism at one end of the valve and a return spring at the other. The other end of the spool can, however, be fitted to any of the 20 other standard operating mechanisms, including the diaphragm. It is claimed that extensive tests have proved the reliability of the unit under extremely arduous working conditions.

"Foam" Fire Fighter

The development of an entirely new type of self-contained, portable, foam fire-fighting appliance has been announced by the Pyrene Company, Limited, Brentford, Middlesex. Designated model A.F.30C, it is a trolley-mounted unit of 30-gall. capacity which produces more than 400 gall. of mechanical foam for use against outbreaks involving quantities of oils, spirits, fats and other inflammable materials. It has been designed to meet a wide variety of fire risks, and has many distinct advantages over the more widely-used chemical foam engine. Additional advantages claimed are that it can easily be manœuvred and operated by only one man and that re-charging can be done on the spot. The unit is operated simply by unwinding the hose and pulling the CO_2 lever in an upward direction, discharge being completed in two minutes. The unit is mounted on a two-wheeled trolley of light, tubular steel construction.

Spray Gun

Alfred Bullows & Sons, Limited, Long Street, Walsall, announce a new spray gun of revolutionary design. The main feature claimed is that it gives good handling and balance, is extremely light in weight, and enormously reduces operator-fatigue as compared with conventional guns. The gun can be pressure fed from a pressure container or gravity bucket and will operate with a syphon cup. It is primarily intended for matching and shading work, where sensitivity and delicacy of control are so necessary for fine shading and stencilling. The body is a Duralumin forging with all wearing threads in brass inserts, and the needle is adjustable for wear, and, although light in weight, the gun is extremely robust in construction.

Rubber Knee-pads

The Expanded Rubber Company, Limited, of Croydon, have introduced a rubber knee-pad for industries where kneeling is involved. It is claimed that the cell construction of the Rubazote pad—as it is named —gives the pad the lightness of a sponge without its water absorption qualities because each cell is completely isolated from its neighbours by a tiny individual air-filled balloon. Thus water cannot enter the cells even if a puddle is knelt in, and moisture cannot collect in the pad and remain there. It is also so designed that pieces of grit cannot slip between the knee and the inside of the pad.

Air Diffuser

Richard Crittall & Company, Limited, 151, Great Portland Street, London, W.1, have produced the Stylovent Mark II, air-diffuser type of ventilator which incorporates a simple form of volume control. A number of sizes is provided from 4 to 10 in. neck dia. each for either exposed or flush mounting, thus rendering them suitable for fitting to most types of ventilation systems. They are designed for noiseless admission or extraction and equable draughtless distribution of large volumes of air, permitting, at the same time, decreased size of air distribution ducts and correspondingly high air-speeds.

A 2-TON steel cradle, being transported from Sheffield to Bury on June 5, was knocked off the lorry as it was passing underneath a low bridge at Meadowhall Road, Sheffield. It was damaged and had to be taken back to Millspaugh, Limited, of Wincobank. The lorry driver's name was Mr. Lowbridge!

Institute of British Foundrymen

ANNUAL REPORT*

May 1, 1955 to April 30, 1956

In this report of the Council covering the twelve months ending April 30, 1956, it is only possible to give a scant and imperfect account of the enormous amount of activity which has taken place at international, national and branch levels during the year. But it can certainly be shown that it has been a year of significant advances in many directions, perhaps most notably in the international field, wherein the Institute's relations with the foundry technical associations of the world and their members were most markedly strengthened as a result of the success which attended the International Foundry Congress held in London, in June, under the auspices of the Institute.

Finance

The income and expenditure account for the year ended December 31, 1955, together with the balance sheet as at that date accompany this report, and reveal a satisfactory credit balance on the year's working. The accounts as presented could, however, be misleading if the continued tendency of costs, particularly printing, to rise were not recognized, and also that in the past year the head office has been understaffed and a substantial increase in the salaries total may be anticipated as soon as suitable staff can be recruited.

Membership

By the simple yard-stick of the average increments in membership over the past few years recruitment during the twelve months under review has been satisfactory. Tables I and II which record the changes in the membership roll during the year, show the total membership at April 21, 1956 to be 5,638 as compared with 5,469 at the corresponding date last year. It will not be denied, however, that the future of the Institute and its influence depend on the growth of its numerical strength. From this point of view the rate of recruitment achieved, falling as it does so far below the target of drawing all qualified foundrymen within the orbit of the Institute, remains somewhat disappointing.

Obituary

By the death of Mr. John Cameron, snr. (past-president), on January 15, the Institute suffered an irreparable loss. Mr. Cameron's membership of almost 40 years was marked by many outstanding services to the Institute and its members, by whom he will be long remembered with affection and esteem. Conspicuous amongst the other deeply regretted losses by death sustained during the year, are the following members whose membership was of exceptionally long standing or who took an active part in the Institute's affairs:—

A. Bruce (associate member) of the Scottish branch who was elected in 1914.

H. Bunting (member) who was a founder member of the East Midlands branch and its honorary secretary for 20 years.

T. G. Hilton (member) of the Lancashire branch who joined the Institute in 1909.

W. Oxley (member) of the Sheffield branch who was elected to the Institute in 1910.

J. Pell (member) who was a very prominent member of the Lancashire branch and who became a member of the Institute in 1909.

W. Rennie (member) who had been a prominent member of the Scottish branch since 1927.

Dr. J. G. A. Skerl (member) who had been a member of the Institute since 1925.

A. E. McRae Smith (member) who for a number of years took an active part in technical committee work.

A complete list of members who have passed away during the year is as shown in Table III.

Tom Makemson Memorial

From a widespread appreciation of the work of the late secretary, Mr. Tom Makemson, sprang a general desire to commemorate his memory in some permanent form. An opportunity to give expression

* Presented at the annual general meeting held at the Park Hotel, Cardiff, on June 13. The report, of course, does not take cognizance of events since April 30.—Editor.

TABLE I.—*Changes in IBF Membership*, 1955-1956.

	Subscribing firms.	Members.	Associate members.	Associates.	Totals.
At April 16, 1955	264	1,938	2,391	876	5,469
Additions and transfers from other grades	3	93	211	89	396
	267	2,031	2,602	965	5,865
Losses and transfers to other grades	2	62	110	53	227
At April 21, 1956	265	1,969	2,492	912	5,638

TABLE II.—*Analysis of IBF Membership at April 21, 1956.*

Branch.	Subscribing firms.		Members.		Associate members.		Associates.		Totals.	
Australian (Victoria)	26	(27)	99	(96)	83	(77)	12	(9)	220	(209)
Birmingham	21	(23)	290	(292)	391	(369)	186	(182)	888	(866)
Bristol	4	(4)	59	(61)	58	(59)	21	(18)	142	(142)
East Midlands	14	(12)	99	(97)	199	(198)	96	(87)	408	(394)
Lancashire	32	(31)	203	(209)	346	(346)	97	(89)	678	(675)
Lincolnshire	1	(1)	18	(17)	60	(54)	17	(20)	96	(92)
London	34	(32)	454	(440)	390	(364)	96	(91)	974	(927)
Newcastle	23	(24)	51	(53)	77	(70)	87	(87)	238	(234)
Scottish	21	(25)	161	(160)	252	(247)	59	(61)	493	(493)
Sheffield	9	(9)	134	(136)	126	(128)	45	(45)	314	(318)
South African	45	(45)	105	(94)	92	(89)	34	(36)	276	(264)
Tees-side	8	(8)	48	(50)	87	(78)	49	(49)	192	(185)
Wales and Monmouth	7	(7)	68	(65)	89	(85)	40	(31)	204	(188)
W.R. of Yorkshire	11	(10)	92	(90)	159	(159)	50	(51)	312	(310)
General	9	(6)	88	(78)	83	(68)	23	(20)	203	(172)
Totals	265	(264)	1,969	(1,938)	2,492	(2,391)	912	(876)	5,638	(5,469)

Figures in brackets are totals at April 16, 1955.

to this desire was afforded by the Council's decision to open a fund to provide a Tom Makemson medal and prize for the best student each year in the final patternmaking examination of the City and Guilds of London Institute, an examination in which Mr. Makemson had taken a special interest from its inception. Substantial subscriptions to the fund were received during the past year, not only from members of the Institute, but from some of the constituent associations of the International Committee of Foundry Technical Associations who wished to be associated with this tribute to Mr. Makemson. In all, a sum of well over £700, which is fully adequate to implement the Council's proposals, has been contributed to the fund. It is hoped to award the first medal and prize during the coming year.

International Foundry Congress

The largest International Foundry Congress ever held in Europe took place in London, under the auspices of the Institute, from June 19 to 25, 1955. The participants included large delegations from Germany, Scandinavia, France, Italy, Holland and Belgium, while America, Spain, Japan, India, Poland, Portugal, Czechoslovakia, Yugoslavia, Switzerland and Israel were also represented. Commonwealth representatives attended from Australia, Canada, South Africa and Nigeria. The Congress was followed by two post-congress tours, one taking in the Birmingham, East Midlands and Lancashire branch areas and the other Glasgow, the North-east Coast and Sheffield. Over 1,000 delegates, ladies and official guests were registered for the Congress in London, and this attendance was increased to about 1,300 by a large number who participated only in the technical sessions or special functions. 171 delegates and ladies, mostly from overseas, took part in the post-congress tours.

At its October meeting the Council thought well to congratulate the committee responsible for organizing the Congress, which has resulted in a marked increase in the Institute's prestige abroad, and a warm development in friendly relations with our overseas foundry confreres. The Council also recorded its gratitude to the many who rendered important and substantial help in making a success of the arrangements by their wholehearted support and co-operation.

TABLE III.—*Obituary.*

Name.	Grade.	Branch	Date joined
Allen, T. F.	A.M.	Lancashire	1949
Bruce, A.	A.M.	Scottish	1914
Bunting, H.	M.	East Midlands	1910
Cameron, J., Snr.	M.	Scottish	1917
Clement, J. K.	M.	Wales and Monmouth	1936
Cooper, A. B.	A.M.	Scottish	1931
Cox, R. L.	M.	Australian	1953
Elliot, G. H.	A.M.	East Midlands	1945
Evans, E. C.	M.	London	1955
Gaston, F. S.	M.	Tees-side	1953
Griffith, R. D.	M.	Birmingham	1947
Hanson, G.	A.M.	London	1945
Hendra, W.	M.	London	1928
Hilton, T. G.	M.	Lancashire	1909
Hulse, J. C.	A.M.	Birmingham	1924
Ives, A.	A.M.	W.R. of Yorkshire	1948
Landale, D.	M.	Scottish	1907
Massey, H.	A.M.	W.R. of Yorkshire	1935
McCaig, D.	M.	Scottish	1947
McGowan, D.	A.M.	W.R. of Yorkshire	1944
McNair, J.	A.M.	Birmingham	1943
Morris, G. T.	M.	Birmingham	1941
Mundell, G. F.	M.	Lancashire	1946
Oxley, Wm.	M.	Sheffield	1910
Payne, R. E.	A.M.	Wales and Monmouth	1947
Peck, D.	A.M.	Sheffield	1943
Pell, J.	M.	Lancashire	1909
Rennie, W.	M.	Scottish	1927
Rhodes, J. H.	A.M.	Lancashire	1945
Rouse, H.	M.	Sheffield	1945
Schwartz, G. J.	A.M.	South Africa	1950
Shaw, R. J.	M.	London	1907
Skerl, Dr. J. G. A.	M.	London	1925
Smith, A. E. Mc.Rae	M.	W.R. of Yorkshire	1938
Tarrant, R. F.	M.	London	1944
Westwood, J. H.	A.M.	Birmingham	1911
Wright, J. W.	A.	East Midlands	1953
Wright, W. Wm.	A.M.	South Africa	1940

Honours Conferred upon Members

The Council congratulates the following members who have been honoured during the past year:—

A. B. Everest, PH.D., F.I.M. (president) who has been elected vice-president of the International Committee of Foundry Technical Associations.

V. C. Faulkner (past-president) who was the recipient of the Award of Honour of the International Committee of Foundry Technical Associations.

H. J. G. Goyns (member) who has been elected president of the Institution of Production Engineers (South African branch).

Dr. J. E. Hurst (past-president) who has had bestowed upon him by the Faculty of Karlsruhe the honorary degree of doctor of engineering.

Professor Albert Portevin (honorary member) who has been made an honorary doctor of the Aachen Technical High School, Germany.

G. D. Thompson (honorary member), the honorary secretary of the Australian (Victoria) branch,

who has been appointed chairman of the mechanical branch of the Institution of Engineers (Australia) which is a chartered body.

C. W. Turner (member) who was awarded the M.B.E. in the Birthday Honours List.

T. Watson (member) who has been elected president of the Refractories Association of Great Britain.

Awards

The following awards were presented at the annual general meeting held in June, 1955:—

E. J. Fox medal: To L. B. Pfeil, O.B.E., D.SC., A.R.S.M., F.I.M., F.R.S., in recognition of his outstanding services to the foundry industry and metallurgy, and in particular for his work on high-temperature alloys.

Oliver Stubbs medal: To Mr. E. S. Renshaw in recognition of his outstanding contributions in the field of cupola practice and the readiness with which he has imparted his knowledge to his fellow-members of the Institute and associated bodies abroad.

Meritorious Services medal: To Mr. John G. Bailes in recognition of his outstanding work on behalf of the Institute and the Sheffield branch, and in particular for the exacting duties he has carried out so efficiently as chairman of the Institute's membership committee.

British Foundry Medal and prize: To Mr. John M. Langham, M.A., A.M.I.MECH.E., A.I.MAR.E., in recognition of the excellence of his paper entitled "Founding of Marine Propellers."

Diplomas: Diplomas were awarded to the following members for papers presented at the branches named:—H. Hart, Scottish branch; A. Talbot, London branch; B. H. C. Waters, M.A., PH.D., Sheffield branch.

John Bell Travelling Scholarship

The first John Bell Travelling Scholarship was awarded to David M. Clinton of Carluke. Mr. Clinton was awarded the scholarship as a result of his performance in the final year of the degree course in metallurgy at the Royal Technical College, Glasgow. Mr. Clinton used the award to undertake a tour of German foundries and an account of his tour appeared in the January issue of the *Journal*.

Branch Activities

A few words of apology are rendered necessary in having, for the sake of brevity, to treat branch activities less fully than they deserve, but reference is made to the enormous programme of lectures, works visits, social events, etc., detailed in the various issues of the *Journal* during the past year. It need hardly be stated that the Council could not be more fully conscious of the fact that the branches are the instrument by which the future of the Institute as a continuing society is decided, and that too much importance cannot be attached to their work. For this reason the Council has been gratified to note that not only have the branches in this country continued to flourish, but that the branches in South Africa and Australia appear to have made no less steady progress. In expressing gratitude and appreciation for the work of all branch officers during the past year, the Council wishes to pay particular tribute to the Lancashire branch Council for its efforts to extend the influence of the Institute in the Stoke area which has resulted in the formation of a section at Stoke, and to the East Midlands branch Council whose Northampton group has now been formed into a section. The efforts of other branches to interest apprentices in the work of the Institute have also been noted with satisfaction.

Edward Williams Lecture

Dr. T. E. Allibone, F.R.S., delivered the eighteenth Edward Williams Lecture at the opening session of the International Foundry Congress held in London on Tuesday, June 21, the title being "Metals Perfect and Imperfect." The 1956 lecture will be presented by W. F. Cartwright at the annual conference of the Institute to be held at Cardiff in June, under the title of the "Use of Castings in a Modern Iron and Steel Works."

National Works Visit Day

A total of 140 members attended the sixth National Works Visits Day held at Bristol on October 7. The Bristol branch who organized the arrangements, provided members with a choice of visits to five groups of foundries. The day's events concluded with a dinner and entertainment at the Grand Hotel, Bristol, at which Mr. D. A. Richards (branch president) expressed warm appreciation of the work of Mr. G. W. Brown (hon. branch secretary) in carrying through the arrangements and the gratitude of the branch to the firms who accepted visitors. This tribute to Mr. Brown and the firms concerned, was endorsed by Dr. A. B. Everest (president) who also renewed congratulations to Mr. R. B. Templeton (past-president) for his part in initiating this very successful development in the Institute's work.

Foundry Foremen's Training Course

An increasingly successful development which stemmed from the original proposals for the application of the Joint Iron Council grant have been the Foundry Foremen's Training Courses. This year's course, a full account of which will appear in the May issue of the *Journal*, was held at Harrogate and attracted the participation of 160 visitors who undoubtedly derived great benefit from the lectures, discussions, personal contacts and exchanges of experiences which this popular event affords.

Educational Activities

The results of the 1955 City and Guilds of London Institute examinations in foundry practice and in patternmaking are reported below. The Institute has continued its active participation in advising on the management of these examinations,

and it is gratifying to observe that the number of candidates was again a record:—

Number of Candidates.	Pass 1st Class.	Pass 2nd Class.
Patternmaking—Intermediate.		
463	69	253
Patternmaking—Final.		
265	49	140
Foundry Practice—Intermediate.		
352	64	211
Foundry Practice—Final.		
174	39	91

The following prizes offered on behalf of the Institute were awarded to successful candidates:—

Foundry Practice, Final Grade: Buchanan medal to R. F. Cornell, Braintree; Buchanan prize to W. H. Caslin, Heston, Middlesex.

Patternmaking, Final Grade: Buchanan prizes to A. E. Young, Braintree, and M. A. Smith, Reading.

Foundry Practice, Intermediate Grade: P. H. Wilson prizes to J. Shields, Middlesbrough (first prize), and C. Pashley, Sheffield (second prize).

Patternmaking, Intermediate Grade: P. H. Wilson prizes to E. Prescott, Birmingham (first prize), and M. Sagar, Pudsey, and G. Skiffington, Hamilton (second prizes).

Distribution of the revised edition of the specimen notes for teachers entitled "Lectures in Foundry Practice" based on the syllabus of the City and Guilds of London Institute's intermediate examination in foundry practice, remains at a high level. The material for the notes for the final examination and for the intermediate and final examinations in patternmaking are now complete. Whilst publication of these notes is the Council's aim, competing claims of other material awaiting publication are creating circumstances which may oblige the Council to lay this purpose aside for the time being.

Publications

Not the least important part of the Institute's activities are the publications which are issued to members. During the year, in addition to the preprints of papers presented at the International Foundry Congress, available to members without charge on request, the following publications are normally issued:—the current volume of the *Proceedings*, and the *Journal* of the Institute, published at two-monthly intervals.

Sales of the "Atlas of Defects in Castings," which in due course it is intended to enlarge, revise and republish, remain at a high level and during the coming year the Council will consider publication of an even more ambitious venture in the "Atlas of Typical Microstructures" on which several of the technical sub-committees have spent many years' work.

Technical Department

Note will be taken from the report of the Technical Council (shortly to be printed) that the technical services of the Institute to its members and the industry have remained undiminished during the past year. That this has been possible is directly due to the collaboration of the Joint Iron Council who have again renewed the grant for research and development. Very few words will suffice to explain that it would be necessary drastically to curtail the secretarial, typing, clerical, and other services now placed at the disposal of the technical committees if the financial resources which the Institute can set aside for this work were not liberally supplemented by the Joint Iron Council, to whom the warmest gratitude and appreciation are expressed. The Council also wishes to record its thanks to the Joint Iron Council for their generous offer, in addition to the substantial help provided for technical committee work, to bear the cost of maintaining the most successful John Gardom Student Fund Scheme, the funds of which had reached complete exhaustion. In future it will be known as the Joint Iron Council Gardom Student Fund Scheme.

Student's Grant

The adjudication of the entries for the 1955 Student's Grant, which has now become a direct award from the Joint Iron Council, was again undertaken by the Institute. On the recommendation of the Council this year's grant was awarded to Mr. Gerald Arthur Passley, who commenced his course at the National Foundry College in September.

Library Service

During the year the fairly large collection of books on foundry practice and kindred subjects in the possession of the Institute were catalogued and a library service for the use of members in the United Kingdom has been established. Copies of the catalogue are available on application to the secretary.

Appointments Register

As an extension of its services, the Institute has formed an appointments register for members who wish to find new employment or to improve their present positions. A fairly wide selection of candidates can now be offered for most posts, and members who wish to recruit staff are requested to co-operate in this scheme by communicating their requirements to the secretary.

Exchange of Foundry Personnel

The International Committee of Foundry Technical Associations, to which the Institute of British Foundrymen is affiliated, has been considering machinery to effect an exchange of foundry personnel who wish to gain experience in other countries. The constituent associations represented on the International Committee, including the Institute, have now agreed to a proposal that a register be

kept of firms in each country who are willing to accept trainees from other countries in return for the advantage of being able to send their own employees to foundries abroad. Details of the scheme are outlined on page 66 of the September issue of the *Journal*, and as the Institute is responsible for compiling the register of firms willing to participate in this country, it is requested that such firms should communicate with the secretary.

International Contacts

The Institute's international contacts were greatly strengthened during the year as a result of the International Foundry Congress held in London. The Institute's secretary continues for a further year to act as secretary of the International Committee of Foundry Technical Associations and the president, Dr. A. B. Everest, as previously reported, has been elected vice-president of the Committee for 1956.

Relations with Other Organizations

The Institute has co-operated during the past year with many outside organizations including the education committee of the Institution of Metallurgists, which has now taken over the work of the former Joint Committee on Metallurgical Education, the committee administering the Mond Nickel Fellowships and many technical committees of the British Standards Institution. On the technical side, similar co-operation has continued with the British Cast Iron Research Association, the British Steel Castings Research Association, the British Non-Ferrous Metals Research Association, the Light Metal Founders' Association, the Association of Bronze and Brass Founders, and the Technical Committee of the Bronze and Brass Ingot Manufacturers' Association.

During the year the Council of the Institute has agreed to co-operate with the Institute of Metals in arranging a symposium on metallurgical aspects of the control of quality in the production of non-ferrous castings, excluding forms for subsequent working, which will be presented at the 1957 spring meeting of the Institute of Metals.

Annual Golf Meeting

The tenth annual meeting of the Institute's Golfing Society was held at Woodhall Spa during the week-end September 23 to 25, and was well attended. Mr. E. A. Phillips was re-elected president of the Society and Mr. V. C. Faulkner, Mr. R. C. Shepherd and Mr. R. B. Templeton were re-elected vice-presidents. Mr. P. G. Pennington continues in office as the honorary secretary.

Lancashire Branch Semi-centenary

Close on the heels of the 50th anniversary of the founding of the Institute on April 9, 1954, has come the semi-centenary of the formation of the first branch of the Institute—the Lancashire branch. On Friday, November 4, 50 years after the historic inaugural meeting of the branch, a dinner was held to celebrate the anniversary and the occasion was honoured by the presence of the national president, Dr. A. B. Everest, and the national senior and junior vice-presidents, Mr. H. J. V. Williams and Mr. J. Blakiston.

Foundry Exhibition, Olympia

An official visit to the Engineering, Marine and Welding Exhibition and the Foundry Trades Exhibition at Olympia, London, on September 5, was well attended by members. The president and the Council of the Institute were entertained at lunch by the organizers of the exhibition.

Council and Committees

The usual quarterly meetings of the Council of the Institute have been held during the past 12 months. Similarly, four meetings of the Technical Council and the executive committee have been held, together with numerous meetings of the standing committees during this period.

Of the members of the Council elected by ballot for two-year periods, five retire each year by rotation. Those who so retire at the annual general meeting in 1956, are: Mr. E. M. Currie, Mr. H. G. Hall, Mr. M. M. Hallett, Mr. R. L. Handley and Mr. A. E. Peace.

Tribute is paid by the Council to the many members who have actively participated in the work of the Institute during the past year. Amongst these members, the chairman and vice-chairman of the Technical Council, Mr. A. E. Peace and Mr. J. McPheat, and the honorary treasurer of the Institute, Mr. N. P. Newman, have again carried out work of a particularly onerous character.

At the annual general meeting to be held at Cardiff on June 13, the Council will nominate the following officers for the year 1956-57:—*As* president: Mr. H. J. V. Williams; *as* senior vice-president: Mr. J. Blakiston; *as* junior vice-president: Mr. A. E. Peace.

1956 Annual Conference

The 53rd annual conference, organized by the Wales and Monmouth branch, will be held at Cardiff from June 12 to 15, 1956, inclusive.

The report is signed by Dr. A. B. Everest, president, and Mr. G. Lambert, secretary.

Export of Aluminium Goods

An announcement by the Board of Trade draws attention to the fact that the export of aluminium scrap is prohibited. In order to ensure that aluminium scrap metal is retained in the United Kingdom, the export of certain aluminium and aluminium alloy goods to any destination will be subject to licence as from Monday, June 11. The relevant Amendment Order is the Export of Goods (Control) (Amendment No. 6) Order, 1956 (SI, No. 789).

The Board of Trade also announces the issue of an open general licence which authorizes the export of certain goods of aluminium or aluminium alloy valued at more than £240 per ton. The licence, which does not apply to exports to China, Macao, North Viet Nam, or Tibet, also came into operation on Monday.

Inquiries regarding the Amendment Order and the open general licence should be made to the Export Licensing Branch, Atlantic House, Holborn Viaduct, London, E.C.1 (telephone: CITy 7533). Copies of the Amendment Order (price 2d.) and of the open general licence (2d.) may be obtained from the Stationery Office.

New Patents

(Copies of complete specifications are obtainable from the Patent Office Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s.)

748,474. Air Reduction Company, 60, East 42nd Street, New York, 17, New York, USA.

A method of bringing a finely-divided solid of low density, such as calcium carbide, into intimate contact with the molten metal of relatively high density. A gas fluidized stream is formed of the solid in which apparent density is at least in the ratio of ¼ lb. of solid per cub. ft. of gas. This stream is forcibly projected at a velocity exceeding 25 cub. ft. of gas, into contact with the molten metal beneath the surface. This force is great enough to cause solid particles to penetrate the interface of fluidizing gas and molten metal beyond the interface.

748,498. Birlec, Limited, Birlec Works, Tyburn Road, Erdington, Birmingham, 24.

Pouring of molten metal from a holding furnace or chamber in a mould or moulds particularly intermittently. The principal object of this method is to enable the metal to be poured in accurate and predetermined volumes which are substantially free from slag and oxide and are at a predetermined temperature. The chamber is provided with an inclined discharge-tube extending from inside the chamber below the level of the metal to outside the chamber above this level. The tube has a restricted metal orifice or similar flow-throttling constriction at its lower end. Gas is intermittently supplied under pressure to the chamber above the metal.

748,551. A. S. Beech and Foundry Equipment, Limited, Linslade Works, Leighton Buzzard, Beds.

Improvements in foundry moulding machines of the hydraulic-squeeze type. An important feature of the invention is that the changeover from the large volume low-pressure supply to the higher pressure smaller-volume supply is automatic and that both supplies are employed in the same cylinder on the machine so that the machine remains fairly simple in construction.

748,642 and **748,643.** J. B. Brennan, 13018, Lake Shore Boulevard, Cleveland, Ohio, USA.

748,642 deals with a method of casting by reduction of the pressure in a mould cavity (to below atmospheric pressure) and then passing into the cavity, degassed molten material. At least a part of the mould defining cavity with the molten metal is then passed through a cooling zone to solidify the material.

748,643 deals with a method of casting by locating moulds in a sequence in a guideway. They are moved along the guideway downwards into a reservoir of molten metal, from which they are successively charged, and then through a cooling zone for solidification of the metal.

748,695. Société Mancelle de Fonderie, 30-32, Rue Sainte Hélène Le Mans (Sarthe), France.

A method for the manufacture of iron having a carbon content of 5 per cent. or higher, or alloys of iron with copper, or with a noble metal. The iron or iron-alloy melt is heated in a crucible which has graphite (or other carbon form) to a temperature ranging from 2,800 to 3,500 deg. C. in a non-oxidizing atmosphere.

748,696. Norton Grinding Wheel Company, Limited, Welwyn Garden City, Herts.

A process of making a sand-phenolic resin mix for the manufacture of shell moulds (*inter alia*). Sand grains are wetted with a plasticiser, and coated with a powdered phenolic resin. The grains are then fluidized with a stream of air or other gas which does not react with the resin at a temperature of not less than 40 deg. C., and not higher than 200 deg. C. The grains are then covered with an adhered substantially uncured resin coating. The fluidizing medium is separated from the resin-coated grains, thereby forming a free-flowing, non-segregating mix of sand-phenolic resin.

748,709. Siegfried Junghans, Grabenstrasse 60, Schorndorf, Wurttenberg, Germany.

A method of continuously casting metals by means of cooled throughflow moulds. The casting jet is introduced into the liquid casting heat with a constant change of the point to which it is directed. It is also claimed that the casting jet is introduced into the zone of the mould cross-section most influenced by the cooling.

748,729. Gebr. Bohler & Company, A. G. Elisabethstrasse 12, Vienna 1, Austria.

A continuously-casting plant for high-melting-point metals. All appliances for carrying out the operation are disposed in several superimposed stages on one side of (or substantially in a plane which extends through the axis of) the billet, whereas the ladle is arranged on the other side of that plane.

748,762. Buderische Eisenwerke, 52-56 Sophienstrasse, Wtzlar, Germany.

Apparatus for emptying moulding boxes. The box has a support, adapted to be set in vibration in order to impart the vibrations to the box. A second support extends below the first support to receive the casting discharged from the box. A receiver for the sand is placed beneath this second support. This second support is constructed as a vibrating conveyor, which is adapted by its vibration to convey the casting from beneath the first support, while allowing the sand to fall below. Guide means are provided for keeping the box in a fixed position on the first support.

Scrap Metal Prices

In Parliament last week the President of the Board of Trade was asked by Mr. John Dugdale (Lab.) what consultations he had with the iron and steel industry and with the scrap metal merchants before he decided to raise the price of scrap metal by £2 a ton.

Mr. A. R. W. Low, Minister of State, who replied, said that, in accordance with the provisions of Section 10 of the Iron and Steel Act, 1953, the Minister consulted the Iron and Steel Board before making the Order increasing the maximum prices of ferrous scrap by an average of £2 a ton. "The Iron and Steel Board informed us of the views of representatives bodies of the iron and steel industry," he said. "The iron and steel industry and the scrap merchants were consulted by the Board of Trade about the manner in which the average increase was to be applied to individual prices."

Mr. Dugdale: "Would it not be correct to say that not only the iron and steel industry but the scrap metal merchants themselves were against this rise, and would it not be worth while considering whether the Government might not make proposals for a decrease down to the figure which existed before the rise? Is not this one case, at any rate, where a rise might be prevented by the Government?" In reply Mr. Low said the views of the scrap merchants in the iron and steel industry were given to them through the Iron and Steel Board, and it was not the usual practice to disclose the advice given to Ministers by statutory boards.

Hot-blast Cupolas in the Foundry*

By W. Heinrichs and W. Brüker

About a year ago, the foundry of Fried. Krupp at Essen, installed a new hot-blast cupola which makes it possible to melt with acid, neutral or basic slag. A few months prior to this, two similar hot-blast cupolas were already in operation as pre-melting furnaces for the open-hearth furnaces of two west-German steel works, but with a different purpose: namely, to provide a suitable material low in silicon, phosphorus and sulphur, produced from charges consisting essentially of scrap, for increasing the output of the open-hearth furnaces in a continuous and economic manner.

The requirements of the foundry are different, that is, a high-grade iron having very close tolerances of the carbon and silicon contents has to be cast immediately into sand moulds. In addition, continuous melting was required, which is possible only under certain conditions. For this reason, carbon blocks were used for lining the cupola, which are neither attacked by acid, neutral or even basic slag. At the commencement, very little information existed about the influence of basic slag on the final carbon and silicon content of the liquid iron and the experience gained within six months was largely due to the application of theoretical considerations for the cupola. These essential features were published by H. Jungbluth and E. Korschan (*Techn. Mitt. Krupp, Forschungsber,* 1938, pp. 79-100) and more recently by D. Fleming: "Relation between Combustion and Metallurgical Reactions in the Cupola" (see FOUNDRY TRADE JOURNAL **95** (1953), pp. 349-58 and 401-405).

Construction

The shaft of the hot-blast cupola has an inside diameter of 76 in., the thickness of the steel shell being 1½ in. After the first lining of the cupola the inside diameter of the hearth was 47 in. and an additional 2½ in. were taken up by the protective firebricks. The bottom was laid down with carbon bricks to a total of 24 in. The height between the bottom surface and the lower edge of the tuyeres is 44 in. The whole rammed-carbon lining is 11-ft. high and above it, a firebrick lining, 7½-ft. high, extends to the top-gas outlet. Built-in below the top, is an "armour" 4½-ft. long and 50-in. dia. The total height of the cupola is nearly 80 ft. Both the chimney and the other flue-gas outlets are bricked out with light refractory bricks.

The hot-blast cupola contains six water-cooled tuyeres, each 7-in. dia. and 12-in. long, and the hot blast is blown in from the ring main through blast connections also of 7-in. dia. The inside diameter at the tuyeres can be varied from 39 to 55 in., which makes it possible to vary the melting rate from 6 to 11 tons per hour. For the cupola jacket between the hearth and the top-gas take-off there are four cooling rings.

Blast Supply

For the reproduction of the hot blast, a recuperator was built with an hourly output of 200,000 cub. ft., having a maximum blast temperature of 600 deg. C. when the temperature in the firing zone reaches 900 deg. C. The top has an average temperature of about 400 deg. C. Circulation of the hot blast is effected by a rotary blower with a capacity of about 300,000 cub. ft. per hour. The air for combustion is drawn in by means of a fan of 175,000 cub. ft. per hour capacity.

The top gases for the heating of the recuperator are withdrawn from a position below the armour, through the top-gas exhaust ring. The necessary exhauster, of 700,000 cub. ft. per hour capacity, is connected behind the recuperator. The whole piping system, as well as the recuperator work under a pressure slightly below atmospheric, *i.e.* of about 9-mm. of mercury below atmospheric. The quantity of top gas to be drawn off is regulated by the top-gas slide-valve and a fine adjustment is possible by means of a throttle valve behind the recuperator.

The total hourly water consumption of the cupola is between 3,000 and 4,000 cub. ft. As part of the water (about 20 per cent.) is used for the granulation of the slag, only about three-quarters can be returned to the system. In order to guarantee correct cooling, two pumps each with a capacity of 8,000 cub. ft. per hour, are provided and built into the feed main; two pumps dealing with a total of 5,000 cub. ft. per hour return the water.

Control

For the purposes of supervision and control, as well as for the further study of metallurgical reactions, the following items are permanently measured and recorded:

(1) Blast volume; (2) blast pressure; (3) hot-blast temperature at the cupola and at the recuperator; (4) quantity of exhaust gases from cupola and recuperator; (5) exhaust-gas temperatures (recuperator); (6) firing temperature (recuperator); (7) temperature of the top gas; (8) CO/CO_2 content; (9) hydrogen content (at the same time, this is used as a precaution against hydrogen-formation in the cupola; (10) temperature of the water (at the nozzle outlet and on the water jacket); (11) total cooling water used during the melting operation; and (12) total cooling water consumption when not melting.

The multiplicity of measurements may seem confusing at the moment, however they are considered essential, as many varied reactions take place in the hot-blast cupola which cannot be estimated individually.

* Abstracted by Dr. O. P. Einerl, from *Technische Mitteilungen, Krupp,* October, 1955.

Hot-blast Cupolas in the Foundry

The hot-blast cupola has been designed to supply any required iron quality in the calculated quantity to the foundry. This demands a very exacting control of the melting process, because the required qualities of liquid iron often differ only slightly as regards carbon and silicon content. In addition, for the production of spheroidal-graphite cast iron in this cupola, sulphur, phosphorus and manganese contents are most important.

Economics

Another important factor at these works is the economic necessity of keeping the cupola in continuous working, wheras normally an iron foundry would only be on single shift work. It is known from similar experience in the steelworks that the cost of liquid metal, when working 24 hours, is only about half the cost of that when working for eight hours only. Actual cost figures are not yet established, as they depend on several variable factors such as composition of charge, cost of cooling water, quality of iron, kind and amount of additive materials, etc., but present experience suggests that the coke charge varies mainly with the quantity of scrap charged and should be between 12 to 18 per cent.

A problem to be faced when melting continuously is that of slag removal and the solution is to separate iron from slag in a syphon arrangement. The iron flows continually into the receivers, one of 5 tons and one of 35 tons capacity. The slag is immediately granulated and swept into a settling tank. The syphon bricking lasts normally for a full week and can be easily reconditioned from the outside of the furnace. There is no refractory lining above the tuyere zone and it is no longer necessary to empty the cupola each day, therefore no patching is necessary, in contradistinction to ordinary cupolas.

Holding

The hot-blast cupola can be " banked " or melting suspended in a way similar to a blast-furnace. After melting and tapping all the iron and slag still left in the cupola, the furnace is filled with coke to the normal working height of the bed coke and this level has to be maintained, but the blast is stopped. This having been done, the banked cupola can still be held in this condition for any length of time. Before re-starting the bed coke has to be filled up to the normal height and charging and blowing can then recommence. It is necessary to maintain water-cooling of the tuyeres and the water-jacket during the period of banking.

In order to achieve the necessary high temperature of the hot blast when working continuously, it is essential to maintain the recuperators scrupulously clean. From the metallurgical point of view, the position of the melting zone and the height of the iron/slag fusion zone, together with temperature control are of utmost importance. After working the hot-blast cupola for twelve months without any major difficulties—this statement includes the recuperator—it can be said that, by working continuously, it will be possible to use this basic, hot-blast cupola economically for the whole range of iron qualities used in the Krupp foundry which will require, after completion of the extension work now in progress, about 5,000 to 6,000 tons of liquid iron per month.

Shell Moulding on the Pacific Coast

By an American Correspondent

The Pacific Coast region of the United States of America, which includes the states of California, Oregon, and Washington, is rapidly becoming one of the major foundry centres. This region, covering an area of more than 300,000 square miles, has to-day about 700 foundries.

In the last 25 years, the greatest advance in the foundry industry has been the introduction of the shell-moulding process. On the Pacific Coast where aircraft construction is one of the principal industries, calling for many stainless steel castings to exact tolerance, shell moulding seems to be the answer.

A complete new shell-moulding foundry has just been put into operation at El Cajon in the suburbs of San Diego some 20 miles from the Mexican border. The foundry, known as Pacific Alloy Engineering Corporation, is equipped with every modern device for the production of castings required in aircraft construction. The administration buildings, research department, and general offices are all finished in fine woodwork, and the entrance is through beautifully landscaped grounds.

Foundrymen all over the country are glad to share their experiences in the shell-moulding process and, ever since the basic principles reached the United States from Germany, much discussion over its value has been going on. But that now seems well established, and a crop of foundries especially designed for the process has sprung up all over the country.

As evidence of its growth, it is now reported that some 422 foundries in the United States and Canada have introduced shell moulding. Two years ago the figure for the United States was 188, and only eight for Canada.

Not so long ago foundries beginning to apply shell moulding made all or nearly all the necessary equipment themselves. Now, several companies are making a speciality of the production of all equipment required. All shell-making operations with the exception of mixing are now accomplished by a single modern machine, which can be handled by unskilled or semi-skilled workers.

Usually foundries entering this field explore the process by constructing experimental equipment, then they set up a pilot line designed to grow progressively into a full production unit. The growth of shell moulding throughout the country has been to a large extent the result of the great progress made in moulding and handling equipment.

Book Reviews

Magnesium—Fabricating and Casting. A Report of a mission to America, published by the European Productivity Agency of the Organization for European Economic Co-operation, and obtainable from H.M. Stationery Office, P.O. Box No. 569, London, S.E.1. Price not stated but probably about 7s.

In America about two-thirds of the production of magnesium alloy is in the form of castings of one sort or another, the balance takes the form of wrought products. To the foundry industry go three alloys; two alloys for sand- and gravity-die-castings known as AZ-63 and A8 in this country, the latter accounting for 80 per cent. of the total. The report states that the Mg-Zr alloys seem less advanced in the States than in Britain. It appears, however, that Mg-Zr alloys containing thorium are distinctly better, especially at high temperatures (300 deg. C.), and are being used for jet-engine components. Such alloys carrying 2.3 per cent. Th and 0.9 per cent. Zr are, however, very extensive.

When dealing with moulding sands—a number of mixtures of which are given, it is pointed out that American practice is much the same as European. For core sands, there is an increasing tendency to use urea formaldehyde in conjunction with ordinary binders. A useful table of the core sands used as for large, small, fragile, and "blown" cores is included. In a section covering the design and construction of the mould, the following information quoted from the report is given "Whereas the normal practice in Europe is to use several casting ladles and a laminated downgate, this method has been almost completely abandoned by American foundries in favour of a cylindrical downgate situated as near to the centre as the shape of the casting permits. The single runner lies in the centre of the mould and is fed from a long head made of cast iron or welded sheet steel and sanded level with the edge of the flask. The mission was impressed by the great skill of the pourers who left the lip of the pot (ladle) at exactly the right time to ensure that the dead heads (risers) are completely filled while at the same time the trough (runner basin) is completely emptied and ready for immediate use on another mould. This arrangement is combined with the very well thought out use of metal filters, made of 0.3 mm. tinplate and with 0.8 to 2 mm. perforation (the distance between the holes being roughly the same as the diameter); these filters are fitted either flat or in rolls, held by two or three electric spot welds. Single or double cylinders are often fitted (filled) with a plug of steel wool."

Chills, usually made in an engineering cast iron, are either coated with a mixture of talc and potassium fluoborate or sprayed with the following: Methylated spirit, 4½ gall.; talc, 20 lb.; shellac, 2 lb.; and boric acid, 1 lb. A note is included on the use of plaster cores. A short section is devoted to pressure-die-casting and the balance of the book covers wrought work. The report is marred by the choice of some strange but understandable words and a few misprints. In general it is quite a useful report of American conditions.

Handbook of Barrel Finishing. By R. F. Enyedy; published by Chapman & Hall, Limited, 37, Essex Street, London, W.C.2. Price 60s. net.

A great effort of the author has gone into this book by the laborious collection of data on the methods of barrel-finishing processes used in one of the big American factories. The examples are well chosen, the remarks are explicit and concise, and well adapted to the practical application shown. Numerous case histories with the author's description of the processed parts lend the book a special interest; in supplying the necessary details of the method it becomes of immediate practical use.

There are, however, limitations in the book. For some of these the author cannot be blamed, because they are simply due to the fact that barrel methods in a shop-floor are not the result of specific research. If any component in question is barrelled satisfactorily so that it passes inspection, that is all that is required for production purposes. Moreover, it appears from many of the case histories that the equipment for the single job was chosen because it was available, and not because it was the best. The book teaches us little we do not know and practice already in this country. It is not comprehensive, and naturally, contains no information about modern barrel finishing as developed in Great Britain, both as regards equipment and methods. H.W.

Department of Scientific and Industrial Research—Report of the year 1954-55; published by H.M. Stationery Office, York House, Kingsway, London, W.C.2; price 7s. 6d. net.

The total income of the various research associations in the country is rapidly approaching the £5,000,000 mark. The foundry industry has attained an income of the order of £250,000. This includes the British Cast Iron Research Association with £191,361, and the British Steel Castings Research Association with £65,361. There is, and always will be, a certain amount of overlapping in the work of the associations and it is interesting to learn that in certain directions such as textiles, for example, there are regular meetings between the directors to minimize waste-effort and duplication. In some groups, as for instance the foundry industry, there is informal co-operation, but a careful study of this report does disclose extra-mural activities. In one case, the British Coke Research Association is carrying out full-scale tests in a foundry as to the influence of coke size on cupola performance. "The results have confirmed that the criteria of performance employed can be used to assess the results of changes due to deliberate variation in coke size and the work is proceeding." In the account of the work of the British Non-Ferrous Metals Research Association, Mr. Rice's report on shell moulding received high commendation.

House Organs

Wiggin Metal Alloys, No. 37; issued by Henry Wiggin & Company, Limited, Wiggin Street, Birmingham, 16.

This is a very special issue as it gives the history of Monel metal since its origination 50 years ago. By and large, Monel metal is not a foundry alloy, but in the wrought-steel state has found wide application as a corrosion-resisting metal. The cover is particularly fine, for it shows, using colour printing, the tapping of an electric furnace.

Close-up, Vol. 1, No. 1; issued jointly by Armstrong Whitworth (Metal Industries), Limited, and Jarrow Metal Industries, from Close Works, Gateshead, 8.

This is the first issue of a new works magazine. It is well produced and, following normal practice, divides its space into notes about the personnel and descriptions of the processes used, and products made, by the company.

International Machine Tool Exhibition

The International Machine Tool Exhibition, which is organized by the Machine Tool Trades Association, will be held in Olympia, London, from Friday, June 22, to Friday, July 6, inclusive. The daily opening hours, Sundays excepted, will be from 9.30 a.m. to 6 p.m., and admission is to be 3s. 6d. per person. The 267 stands occupy an area of more than 252,000 sq. ft. and exhibits will include metalworking machine tools; woodworking machinery; engineers' small tools, gauges and measuring equipment; presses and power hammers and heat-treatment plant. A "service centre" on the second floor of the Empire Hall will provide amenities for the benefit of visitors and exhibitors. Some of the items of interest to foundrymen are summarized below.

AMONGST the range of engineers' tools, permanent magnets, die steels, magnetic chucks, etc., which Edgar Allen & Company, Limited, Sheffield, will display on stand No. 309 (Grand Hall (Gallery)), will be the Plowrake tool for both heavy and intermittent cutting of steel forgings, castings and die-blocks, and the Plowcast tool for planing cast iron.

THE 600 GROUP of companies will be exhibiting on no fewer than six stands—Nos. 66 and 71 in the Grand Hall annexe; Nos. 41, 46, and 55 in the Grand Hall; and No. 415, first floor, National Hall Gallery. The machines on show will be representative both of those actually manufactured by companies within the group and of the wide range of British, American, and Continental machines for which the group act as distributors in the United Kingdom.

B. O. MORRIS, LIMITED, of Coventry, will be displaying a comprehensive range of their flexible-shaft and polishing-shop equipment on stand No. 611 (second floor). The exhibit will be divided into the following sections: Flexible-shaft equipment; polishing machine/abrasive-belt machine section; special-purpose machines; automatic-polishing machines; and "versatiles" where a range of the new multi-purpose, multi-head milling/drilling machines will be on view.

TWO WOODWORKING MACHINES, the band re-saw, type EH/T, and the dimension saw-bench, type ET/E, recently introduced by Thomas Robinson & Son, Limited, Railway Works, Rochdale, will be exhibited (stand No. 105, National Hall), as also will be another of the firm's recent additions, an independent top-throating head-unit, type XT/E. The latter is claimed to much simplify many classes of work such as the throating of sills, production of undercut moulds, etc.

ON THE STAND of Radio Heaters, Limited, Wokingham, Berks (No. 57), the new Radyne 25-kw. induction heating equipment will be on display for the first time. This equipment incorporates a unique smoothly-variable heat output transformer giving a 20:1 control range. It simultaneously and automatically also ensures correct matching with any work coil used. A 3½-kw. bench model, which has a built-in variable radio-frequency heat output transformer, and the 6-kw. equipment will also be on show.

DURING the period of the exhibition, Manchester Oil Refinery (Sales), Limited, are making available supplies of lubricants and greases, free of charge, to other stand holders. Products which the firm are exhibiting (stand 607) in this line, include a number of new cutting oils which have been specially developed for the machining of tougher metals such as Nimonic and titanium-alloy steels. Non-destructive flaw-detection inks, including a new group of dye-penetrant inks, will also be shown.

DALLOW LAMBERT & COMPANY, LIMITED, Thurmaston, Leicester (stand No. 637a), will display equipment for collecting all types of dusts, chippings and granular materials set up by manufacturing processes such as machine grinding, buffing, fettling, etc. A special feature is made of cast-iron dust control. Plant installations are tailor-made for each problem; they comprise fan, ducting, etc., and are supplied with either a "Multiswirl" wet collector, cyclone, or "Drytube" (fabric) filter, depending upon the type of dust to be collected.

ON STAND No. 619, Lancashire Dynamo & Crypto, Limited, will show a Ward Leonard equipment typical of sets supplied for planer and similar drives. The exhibit will consist of a 50/25 h.p. 700/350 r.p.m. motor giving speeds of 60/30 ft. per min. on the Plano-Shearing machine for which it is designed. There will also be a display of flange mounting motors with four different mounting arrangements; a frequent reversing motor with silicone (class "H") insulation; and a working exhibit will show each of three sizes of electro-mechanical brakes.

HARDING MACHINE TOOLS, LIMITED, Feltham, Middlesex, will exhibit on stand No. 427 their HLV and HCT lathes, together with an HLV lathe fitted with the new hydraulic-copying attachment which has recently been developed. One of the most prominent new features of these lathes is the flat bed, consisting of a single flat plate of hardened steel mounted on a cast-iron bed. Headstock, carriage and tailstock have flat bases, which are scraped to this flat plate, the total bearing being 145 sq. in. and this, plus the fact that the vees are undercut, makes for extreme rigidity.

THE DISPLAY of the Norton Grinding Wheel Company, Limited, on stand No. 316, will include BD reinforced wheels, specially designed for use on right-angle portable grinders and heavy-duty sanders—the nicking and notching of gates and risers is one of the many uses to which these wheels can be put. Grinding wheels made with a new bond for precision and semi-precision grinding, and the new B9 cutting-off wheels with "F"-type sides will be shown as applied to rapid and clean cutting off, in addition to B11 resinoid-bonded wheels which are claimed to be fast and economical in high-speed fettling.

ELECTRIC RESISTANCE FURNACE COMPANY, Weybridge, Surrey, will exhibit on stand No. 6 a furnace with the revolutionary Corrtherm heating element. The furnace is a standard controlled-atmosphere unit for gas carburizing, carbonitriding, bright hardening and bright annealing, rated at 20 kva. with a charge space 24-in. long by 12-in. wide by 10-in. high. Corrtherm elements are sheets of corrugated nickel/chromium alloy which practically cover the entire walls of the furnace. These sheets are hung from alloy hooks extending through the roof, making installation and replacement very simple. The corrugations give strength, and greater length for greater resistance; they can be spaced to vary the heat release along the length of the furnace to compensate for heat losses at the door or incoming cold work.

ORDERS for four ships worth £2,000,000 have been received by Austin & Pickersgill, Limited, Sunderland. The Trader Navigation Company, Limited, and W. J. Tatem, Limited, both of London, have each ordered a 10,000-ton cargo ship. A collier of 4,200 tons has been ordered by the South Eastern Gas Board and a motor-ship of 2,500 tons by the Astoria Shipping & Transport Company, Limited.

Company News

RUBERY, OWEN & COMPANY, LIMITED—The company announces that for the current calendar year to date it has obtained orders from abroad totalling well over £1,000,000.

INDIAN IRON & STEEL COMPANY, LIMITED—The directors have decided to redeem the 4½ per cent. first mortgage debentures on January 1, 1957, at a premium of 2 per cent. Notices will be posted to holders shortly.

METAL AGENCIES, LIMITED—With all branches showing an increase in turnover and productivity, group profit in the year to February 29 was a record at £337,263, compared with £265,777 in 1954-55, struck after charges of £147,376 (£115,157).

SIDNEY FLAVEL & COMPANY, LIMITED, gas appliance manufacturers, of Leamington Spa—The company will not be paying an interim dividend for the year ending July 31, 1956, as profits are not available for this purpose. The previous year an interim of 6 per cent. was followed by a 4 per cent. final.

SAUNDERS VALVE COMPANY, LIMITED—A final dividend of 14 per cent. is being paid for the 11 months to March 31, 1956, on the capital increased by a one-for-six scrip issue. An interim of 6 per cent. was paid before the increase. This repeats the previous year's total of 20 per cent. on the smaller capital.

CONSETT IRON COMPANY, LIMITED—An interim dividend of 3 per cent. for the year to September 30, 1956, is being paid, as forecast when the £10,000,000 one-class ordinary capital was offered for sale by the Iron and Steel Holding and Realization Agency last December. A total of 7½ per cent. for 1955-56 was then anticipated.

S. RUSSELL & SONS, LIMITED, engineers and iron-founders, of Leicester—A final dividend of 12½ per cent. is being paid, making 17½ per cent. for the year ended March 31, against 15 per cent., including a bonus of 2½ per cent., for the previous year. Net profits were £163,929 (against £129,865) before tax of £76,833 (£63,945).

MORGAN CRUCIBLE COMPANY, LIMITED—For the year to March 31, a final dividend of 6½ per cent., plus a 1 per cent. centenary bonus, is recommended, making a total of 11 per cent., compared with the equivalent of 10 per cent. represented by the previous 17½ per cent., including 2½ per cent. bonus, paid before a 75 per cent. scrip issue, in 1954-55.

VENT-AXIA, LIMITED, ventilating equipment manufacturers, of London, S.W.1—Group profits, before tax, rose from £158,346 to £212,575 for the year to March 31 last, and the ordinary dividend total is increased by 10 per cent. A final of 65 per cent., against 55 per cent., is recommended, making 95 per cent. (85 per cent.), the total net cost being £35,834 (£31,570).

WILLIAM COOK & SONS (SHEFFIELD), LIMITED, makers of steel castings—In spite of increased competition, the order-book is in a satisfactory condition and there are indications that demand for products is still unsatisfied, reports Mr. A. McT. Cook, chairman. The expansion programme should be completed by the end of November, he says, some five months sooner than expected.

UNIVERSAL GRINDING WHEEL COMPANY, LIMITED—A proposal for a one-for-10 scrip issue is announced. The company is to pay an interim dividend of 10 per cent., free of tax, on the £486,127 15s. ordinary and £12,167 10s. employees' stock in respect of the year ending September 30, 1956. A similar amount was paid in 1954-55 on £440,963 ordinary and £10,688 employees' stock.

MCKECHNIE BROS., LIMITED, non-ferrous metal manufacturers, of Birmingham—An interim dividend of 5 per cent. has been declared on the ordinary and "A" ordinary capitals on account of the year to July 31, 1956, payable June 30. This is the first dividend since the offer for sale of 300,000 "A" ordinary £1 shares in February, and the commencement of dealings on the London, Liverpool, and Birmingham Stock Exchanges. A dividend of 12½ per cent. for the full year to July was forecast, including an unstated interim for this month. The 1954-55 dividend of 37½ per cent. on the old capital was equivalent to 12½ per cent. on the present amount of £2,295,036.

SPECIALLOID, LIMITED—The company is issuing 1,099,926 2s. ordinary shares at 3s. per share. The proceeds will be applied in the repayment of the whole of the second debentures (£61,100), payment of net arrears on the 5½ per cent. preference (£37,950), reducing bank indebtedness by £60,000, and meeting expenses of the issue estimated at £5,939. Holders of the second debentures (due for repayment at par at the end of this month) are given the option of receiving, instead of cash, one fully paid-up 2s. ordinary in respect of each 3s. of debenture held. If exercised in full, this option will absorb 407,333 ordinary. Preference shareholders registered on May 31 are given a similar option in respect of their net arrears of dividend. This option, if exercised in full, will absorb 253,000 ordinary. Ordinary shareholders are offered 400,074 ordinary for cash on a one-for-one basis at 3s. per share.

Board Changes

BLAKEY'S BOOT PROTECTORS, LIMITED—Mr. Harry Kirk has been appointed a director.

EUCLID (GREAT BRITAIN), LIMITED—Mr. N. S. Brown has been appointed to the board and will continue to act as secretary.

ALLEN WEST & COMPANY, LIMITED—Mr. L. A. Stride has retired from the board and Mr. G. H. Cann has been appointed a director.

BRITISH CHROME & CHEMICALS, LIMITED—Mr. L. W. Grainge, group labour manager, has been appointed to the board and a special director of British Chrome & Chemicals (Holdings), Limited.

BLAW KNOX, LIMITED—Mr. A. E. Percivall has been appointed to the board. He has been chief engineer of the company's tower department for many years. Mr. E. F. B. Dykes, who has also been appointed to the board, has been associated with the company on its constructional machinery side since 1934.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

THAILAND, August 9—Steel rails and accessories, for the Royal State Railways of Thailand. (ESB/13662/56.)

INDIA, July 6—Stone crushing machinery, for the Director-General of Supplies and Disposals, Government of India. (ESB/13510/56.)

PORTUGUESE EAST AFRICA, June 27—Hydraulic jacks, for the Province of Mozambique Directorate of Port, Railway and Transport Services, Beira Port and Railway Operating Division. (ESB/13233/56.)

PORTUGUESE WEST AFRICA, July 10—Permanent way materials, equipment, and tools, for the Angola Port, Railway and Transport Services and Luanda Port and Railway Operating Board. (ESB/13256/56.)

News in Brief

ATLAS COPCO has acquired the controlling interest in Arpic Engineering SA of Belgium.

THE FOUNDATION STONE of the new engineering block at Queen Mary's College (University of London) was laid on June 5 by Queen Elizabeth the Queen Mother.

THE 75TH ANNUAL MEETING of the Society of Chemical Industry will be held in London from July 9 to 14. Details are available from the Press Office, Imperial Chemical House, Millbank, London, S.W.1.

AS A RESULT of changing from double to single-shift working, foundry workers at Dartmouth Auto Castings, Limited, Smethwick, resumed full-time working last week after being on short time for more than two months.

FOUNDRIES with plans in hand for new buildings and extensions include: Shotton Bros., Limited, ironfounders, Oldbury, Birmingham; Wellingborough Iron Company, Limited, Northants; and Neville Foundry Company, Limited, Rotherham, Yorks.

THE WORKS of John Hill & Sons (Ironfounders), Limited, Horsley Fields, Wolverhampton, will be closed from Friday evening, August 10, to Monday morning, August 27, for the annual holiday. A small office staff will be on duty to deal with urgent matters.

VALUED at about £350,000, an order has been received by the English Electric Company, Limited, from the Crown Agents for Overseas Governments, to supply and erect two 10,000-kw. steam turbo-alternator sets for the Malayan Central Electricity Board.

MR. MARK BEVAN, staff supervisor of the Midland Bank, playwright and contributor to "Punch," was the speaker at the June luncheon of the Non-Ferrous Club. At this meeting a collection was taken on behalf of the Royal Metal Trades Pension and Benevolent Association which realized £10 10s.

THE BOARD OF TRADE announces that in pursuance of Section 7 of the Merchandise Marks Act, 1926, a draft Order-in-Council was laid before Parliament on May 29, requiring certain imported oil-burning apparatus to bear an indication of origin. Copies of the draft Order may be obtained from the Stationery Office, price 2d.

FOUNDRY SERVICES, LIMITED, Long Acre, Nechells, Birmingham 7, announce that following the visit of the Rt. Hon. Reginald Maudlin to their stand at the British Industries Fair, much interest has been shown by steel-ingot manufacturers in the potentialities of their exothermic feeding compound "Feedex" for the reduction of piping.

FOR HIS ATTEMPT to rescue a workmate from a pool of molten slag last February, John Moffatt, a 26-year-old steelworker at the Britannia Works, Middlesbrough, of Dorman Long & Company, Limited, has received the "Order of Industrial Heroism." He risked his life and suffered burns on his arms and legs in rescuing the man, who subsequently died in hospital.

QUASI-ARC, LIMITED, of Bilston, Staffordshire, announce the addition of Vordian electrodes, a general-purpose type for welding mild steel in all positions, to their range. Conforming to B.S.639:1952 and B.S.2549:1954, they are approved by Lloyd's Register of Shipping and the Ministry of Transport and Civil Aviation for the welding of mild steel in all positions.

EMPLOYMENT for several hundred highly-skilled workers will be provided when Honeywell-Brown, Limited, take over a 45,000-sq. ft. factory adjoining their present works at Newhouse, Lanarkshire. The factory is at present tenanted by Ranco, Limited, who plan to move into bigger premises at Tannochside within a few weeks. The Honeywell-Brown firm already occupies 102,000 sq. ft. of manufacturing space and employs 850 people at Newhouse.

INTERNATIONAL FURNACE EQUIPMENT COMPANY, LIMITED, Aldridge, Staffs., have concluded an agreement to represent and manufacture the products of Holcroft & Company, of Detroit, Michigan. The agreement covers Great Britain, Australasia, and all British Colonies and Dominions except Canada, for heat-treatment furnaces. Typical heat-treating applications include carburizing, carbonitriding, clean hardening, isothermal heat treating, and atmosphere generation.

BRITISH INSTITUTE OF MANAGEMENT, 8, Hill Street, London, W.1, introduces this month its first series of seminars in management development and education. Under the title "Planning a Management Development Programme," a group of senior managers and training officers from various types of industry will study and discuss means of meeting the shortage of new managers for the future. All places have been filled for the present series, but plans are already being made for further seminars to be held.

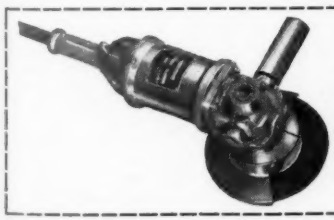
THE POPULAR CONCEPTION of a "push-button" factory controlled by an electronic brain was a ridiculous one, said Mr. R. H. Garner, principal of Coatbridge Technical College, at a recent conference in Dundee, promoted by the Scottish regional committee of the Institution of Industrial Supervisors. The theme of the conference, which was held at the Timex factory of the U.K. Time Corporation, was the future of the foreman. About 120 men and a number of women who are foremen or supervisors in Scottish industries attended.

THE BOARD OF TRADE is considering the question of the renewal for the period August 19, 1956, to February 18, 1957, of the exemptions from key industry duty as set out in the Safeguarding of Industries Exemption Orders Nos. 2, 3, and 5, 1956, and in any further Exemption Orders which may be made before August 19 under Section 10 (5) of the Finance Act, 1926, as amended by subsequent enactments. Lists of the articles exempted from key industry duty by these Orders until August 18 were published as Statutory Instruments, 1956, Nos. 169, 486, and 717. Any communications arising out of this announcement should be addressed to the Tariff Division, Board of Trade, Horse Guards Avenue, London, S.W.1, by June 16.

KINGSTON BRASS COMPANY, LIMITED, architectural metal workers, Glasgow, have received an order from the Buganda Government to design and construct the main entrance gates to the official residence of the Kabaka of Buganda. The Kabaka wished to have the gates for his Mengo Palace made in the style of those at the Palace of Holyroodhouse. The ironwork of these gates carries rich ornamentation in a repeating scroll motif. This motif will support cast bronze panels with the royal crest sculptured in relief and finely hand chased. The crest shows a lion dormant, surmounted by crossed hunting swords behind a warrior's shield. The main rails of the gate finish in a lance head, the curved transom and straight mid-rail having a design of simple circles. Because of their great weight the main gates are to be fitted with bronze rollers running on a steel track. It is expected that they will be completed and delivered by the autumn. The value of the order is between £2,000 and £3,000.

Speeds up to 16,000 surface feet per minute bring amazing performance figures with Hicycle Grinders

The use of high-speed grinders with the modern type of grinding and cut off wheel is now well established as a means of increasing production. These high speeds necessarily place a great strain on the machines, and to ensure continuity of service and low upkeep, Hicycle tools should be specified for all high-speed work. They have indestructible rotors which cannot burn out, and this means an immense economy in any shop having tools in regular use. If high-speed grinding and cut off wheels can be operated at their maximum speed of 16,000 surface feet per minute, amazing performances can be obtained. Such speeds are available only with Hicycle grinders. Ask for descriptive brochure SP.354.



Hicycle
PRODUCTION TOOLS

MANUFACTURED BY THE CONSOLIDATED PNEUMATIC TOOL COMPANY LIMITED, 232 DAWES ROAD, LONDON, S.W.6
510H

Raw Material Markets

Iron and Steel

There is little variation to report in the volume of orders on hand at the foundries. Although some sections of the engineering and speciality foundries are less busy than they were—mainly those supplying castings to the motor vehicle trades—they continue to be the most favourably employed, as other branches of industry are specifying freely for high-duty castings. The call for castings from the motor-car makers is much reduced. As a result, some foundries continue to operate a four-day week, which has reduced their demand for pig-iron in the hematite and low-phosphorus and medium-phosphorus grades. Production of these descriptions is at a good level, the furnaces having been able to send increased tonnages to the busier foundries.

Refined irons are in fairly good supply. Deliveries of Scotch low-phosphorus pig-iron are reduced on account of the prior claims for basic pig-iron for the steelworks north of the Border.

The jobbing foundries are fairly busy, and although the light and textile foundries are steadily employed, their order-books are by no means heavy. Some sections of the light foundries are better employed than others, depending on the type of casting produced. The call for castings for domestic utensils shows little sign of improvement. The supply of high-phosphorus pig-iron is about sufficient for current needs.

The re-rollers maintain relatively good outputs. At some mills, fortunately, an improvement is noted in manpower. Practically the whole of the output of small bars, light sections, strip, etc., is being supplied to home consumers and stockists, leaving little opportunity to take advantage of the large amount of export trade available. Generally, sufficient supplies of steel semis are on hand, but stocks have been reduced and pressure for supplies from home steelworks has increased, chiefly for the smaller sizes of billets and special quality steels.

Non-ferrous Metals

The recovery in the London copper price in the middle of last week failed to arouse general consumer demand and prices reacted to their former levels. The important factor has been the appreciable improvement in supplies available to the London Metal Exchange which has eliminated the backwardation for the first time since August, 1953.

London is exerting a strong influence on the United States market; although the producers' price remains at 46 cents a pound, and the Custom smelters' price at 40 cents, scrap prices—now the only real barometer of the supply and demand situation—have been fluctuating in sympathy with London and the price has been ranging from 30 cents to 31½ cents a pound. The tendency appears to be for scrap prices to harden.

Meanwhile, copper demand in the States is small and the fabricators, hard hit by the cutbacks in the automobile industry and by the reduced demand from the appliances industry, have in reducing their own operations variously laid off workers, cut out overtime, introduced a four-day week, or extended the holiday period.

Demand for tin is reasonably good on both sides of the Atlantic. Not much change, however, is looked for in the US price until the steel wage negotiations have been completed. The UK Government has called a meeting for June 29 in London of all the signatories to the international tin agreement to decide when the agreement will come into effect. It is believed that the meeting will nominate July 1 as the date for the pact's inception.

Lead has been a fair market in London and nearby metal is not plentiful. Demand has improved partly on reports of renewed labour unrest at the docks in Australia. In the US buying is inconsistent. Although demand from battery manufacturers has been relatively poor, battery replacements during the first four months of the year were higher than in the corresponding period a year ago, strongly suggesting that the manufacturers are running down their stocks.

Demand for zinc is quietly steady here. In America, where buying is on the basis of 13½ cents a pound for "Prime Western," market activity is sporadic.

Official Metal prices were as follow:—

COPPER, Standard—*Cash:* June 7, £302 10s. to £303 10s.; June 8, £298 10s. to £299; June 11, £297 10s. to £298; June 12, £307 to £308; June 13, £311 10s. to £312.

Three Months: June 7, £305 to £306; June 8, £300 to £301; June 11, £299 10s. to £300; June 12, £308 to £309; June 13, £312 to £313.

TIN, Standard—*Cash:* June 7, £730 to £732; June 8, £735 to £736; June 11, £736 to £736 10s.; June 12, £737 to £738; June 13, £743 to £744.

Three Months: June 7, £729 to £730; June 8, £732 10s. to £733 10s.; June 11, £732 10s. to £733; June 12, £733 to £734; June 13, £738 to £739.

LEAD—*First half June:* June 7, £111 10s. to £111 15s.; June 8, £111 5s. to £111 10s.; June 11, £112 5s. to £112 10s.; June 12, £113 to £113 5s.; June 13, £117 to £117 10s.

First half September: June 7, £109 15s. to £110; June 8, £109 10s. to £109 15s.; June 11, £110 to £110 10s.; June 12, £111 to £111 5s.; June 13, £114 10s. to £114 15s.

ZINC—*First half June:* June 7, £91 15s. to £92 5s.; June 8, £93 to £93 5s.; June 11, £94 5s. to £94 15s.; June 12, £95 10s. to £95 15s.; June 13, £98 10s. to £99.

First half September: June 7, £90 5s. to £90 10s. June 8, £90 15s. to £91 5s.; June 11, £92 15s. to £93; June 12, £93 10s. to £94; June 13, £96 5s. to £96 10s.

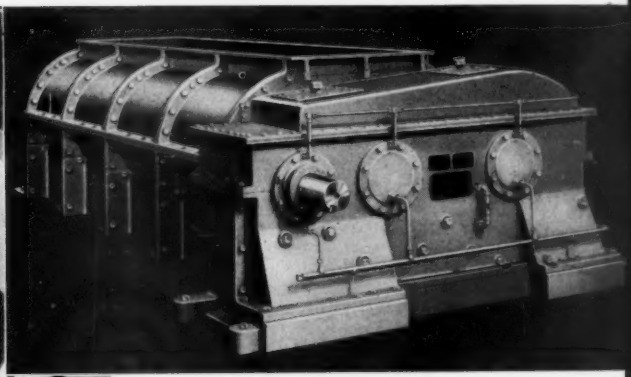
£5,000,000 Wage Increases

In the first four months of 1956, 10,220,000 workers received increases in weekly wages amounting to £5,130,000. In the same period last year there was a net increase of £3,520,000 in the weekly wages of 9,060,000. During April, 2,830,000 workers won increases amounting to £1,190,000, and the weekly wage index rose by one point to 163 (June, 1947 = 100), a seven-point rise since the end of 1955.

The number of unfilled vacancies in industry rose during the four weeks ended April 4 from 380,400 to 390,400. Industrial disputes during April cost 143,000 working days, compared with 384,000 in March and 198,000 in April, 1955. Disputes in coal mining cost 62,000 workdays and disputes in the vehicle industry 29,000. The total number of days lost by strikes in the first four months of 1956 was 799,000, compared with 587,000 in the same period of 1955.

AT the Birmingham and District Industrial Safety Training Centre, Summer Road, Acocks Green, Birmingham, 27, on June 26, there is to be a course of training for crane drivers and slingers, and on June 29 and 30, a general course on safety for maintenance workers, millwrights, etc. Applications to attend should be made to Mr. W. G. Appleyard, 21, Steelhouse Lane, Birmingham, 4.

FOUNDRY EQUIPMENT —
Batch and Continuous Sand Mixers



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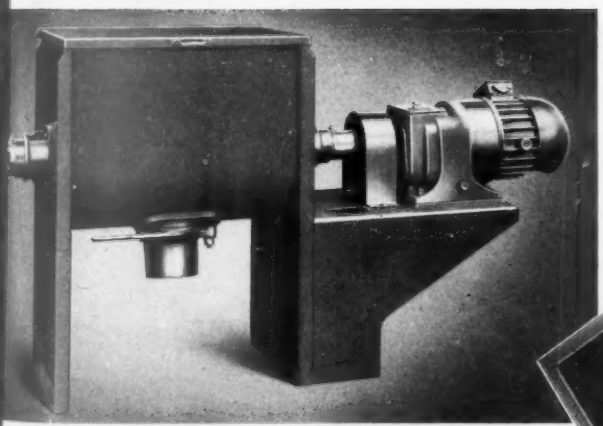
As made and installed by Baker Perkins, U.S.A. in America's largest foundries.

Built in standard sizes with continuous outputs of 6 tons to 120 tons per hour of thoroughly aerated and homogeneously mixed moulding sand.



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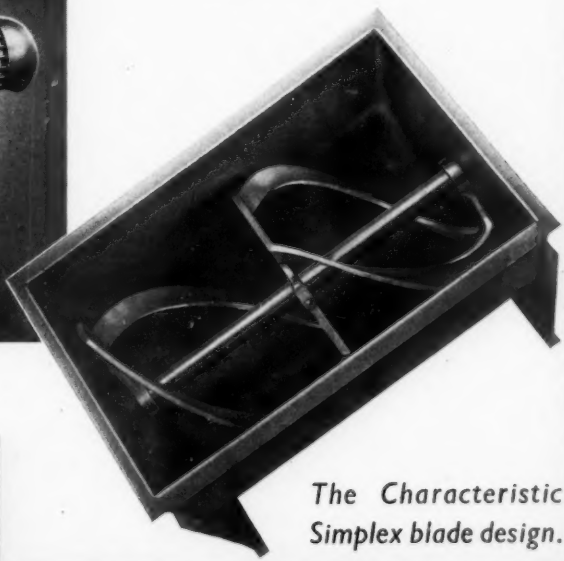

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REDUCE STORAGE SPACE

GUNMETAL and PHOSPHOR-BRONZE INGOTS

The smaller undivided Esco Ingot possesses many advantages over the old shape. Test Certificates are available for every batch.

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ALUMINIUM WORKS, WILLOW LANE, MITCHAM, SURREY

Durham University has app... A. G. GRANT, managing director of Whessoe, Limited, and chairman of the Education Committee of the Federation of British Industries, as chairman of the Appointments Board. He succeeds SIR CLAUDE DIXON GIBB, chairman and managing director of C. A. Parsons & Company, Limited.

Ford Motor Company, Limited, Dagenham, announce that MR. F. PEARSON is relinquishing his position as manager of the blast-furnace and coke oven operations, having reached retirement age. Mr. Pearson will continue for a period to assist in the development of projects relating to this section. MR. L. CHILDS succeeds Mr. Pearson as manager.

MR. J. C. HOWARD, M.B.E., of Foundry Equipment, Limited, Leighton Buzzard, is visiting Austria and Yugoslavia. He gave a lecture entitled "Recent Developments in the Mechanization of British Foundries" to the Austrian National Foundrymen's Congress, in Vienna, on May 25, and repeated the paper at a meeting of Yugoslav foundrymen at the Institute of Metals, Belgrade, on May 30.

MR. A. WOODS, formerly with Polygram Casting Company, Limited, is to join the Shallway Corporation of Connelsville, Pensylvania, at the end of this month as European manager. Mr. Woods received his early training in the works of the Austin Motor Company, Limited. The firm has announced the opening of a temporary European office at Düsseldorf, in Germany.

The managing director of the United Steel Companies, Limited, MR. GERALD STEEL, has been appointed to the board of the National Provincial Bank. Previously he was a Sheffield local director. Among his business posts Mr. Steel includes the chairmanship of Samuel Fox & Company, Limited, the Distington Engineering Company, Limited, and the Yorkshire Engine Company, Limited.

RUSSELL, joint managing director ... Sons, Limited, ironfounders, Leicester, ... June 1, at the age of 68. He had also been, since 1947, the chairman of the Bridge Building and Constructional Engineering Employers Association, Midland area. At the end of the first world war he received the M.B.E. for his services as manager of the Leicester and district armaments group. He was personal representative of the Bishop of Nottingham on the National Catholic Education Council and four years ago was awarded the Gold Star by the Pope for services to Catholic education in Leicester.

COUNCILLOR OLIVER INMAN, a director of Samuel Fox & Company, Limited, steel manufacturers, Stocksbridge, Sheffield, died on June 5, after a short illness. He recently retired from the position of director of developments, but remained on the board and was an engineering consultant to the firm. Altogether he served the firm 28 years, and was responsible for the installation quite recently of the 60-ton arc furnace, then the largest electric furnace in Europe. He was a member of the Yorkshire Electricity Consultative Council and of the Sheffield District Smoke Abatement Committee.

Recent Wills

SCOTT, R. V., former chief cashier of Rolls-Royce, Limited £8,776

SMITH, W. C., a director and works manager of the Guest Keen Iron & Steel Company, Limited ... £12,878

ADAMSON, J. L., contracts manager in the furnace department of the Wellman Smith Owen Engineering Corporation, Limited £13,516

HAYTON, C. E. P., late joint managing director of B. & S. Massey, Limited, steam-hammer manufacturers, of Openshaw, Manchester £39,174

HARRISON, C. P., manager of the marine department of the General Electric Company, Limited, and a member of the council of the Institute of Marine Engineers £12,347

THOMAS, THOMAS, principal of Thomas Thomas & Company (Est. 1919), Limited, iron and steel merchants, of Middlesbrough, and chairman of A. Bainbridge, Limited, scrap iron and steel merchants, of Thornaby-on-Tees £46,202